Diatom Taxonomy in the 21st Century

Symposium in honour of Henri Van Heurck

Meise
Belgium

23 - 26
August

2009

Programme & Abstracts

DEPOT READING ROOM

B. Van de Vijver & C. Cocquyt
(editors)

Diatom Taxonomy in the 21st Century

in honour of Henri Van Heurck

Programme
&
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23-26 August 2009
National Botanic Garden of Belgium
Meise (Belgium)

0 8 SEP. 2010

86 992

Meise
National Botanic Garden of Belgium

Scripta Botanica Belgica
Miscellaneous documentation
published by the National Botanic Garden of Belgium
Series editor: E. Robbrecht

Volume 45
B. Van de Vijver & C. Cocquyt (eds.)
Diatom Taxonomy in the 21st century
Programme & Abstracts

CIP Royal Library Albert I, Brussels
Diatom Taxonomy in the 21st century – Programme & Abstracts. B. Van de Vijver & C. Cocquyt (eds.) – Meise, National Botanic Garden of Belgium, 2009. – 103 pp.; 22 x 15 cm. – (Scripta Botanica Belgica, Vol. 45)

ISBN 9789072619808
ISSN 0779-2387
D/2009/0325/2

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Printed in Belgium

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DIATOM

Diatom Taxonomy in the 21st Century

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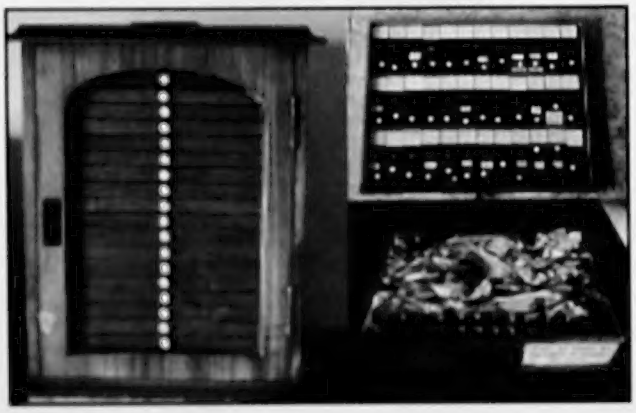
Patrick Kociolek, University of Colorado, USA
Horst Lange-Bertalot, J.W. Goethe Universität, Germany
Eileen Cox, Natural History Museum, UK
Jonathan Taylor, North-West University, South Africa

Preface

In 1909, Henri Van Heurck (°1838), the most famous Belgian diatomist died in Antwerp. Van Heurck was manager of the family business (a paint and varnish factory) and professor in chemistry at the Industrial High School in Antwerp. As a self-made botanist, he carried out pioneering work in microscopy, and later became famous for his research on diatoms. He convinced the municipality of Antwerp to establish a Botanic Garden in Antwerp and became its director. He spent a fortune enlarging his own herbarium including dried plant specimens, mushrooms and, most important, a large set of diatom slides, making this herbarium at that time one of the largest in the world. After death, all collections and herbarium were purchased by the municipality of Antwerp forming the core of the former herbarium AWH. Recently, the entire herbarium was set on permanent loan to the herbarium of the National Botanical Garden of Belgium (BR) where it will be made available to the large scientific public. Among his publications are several books such as Le Microscope (1865) and the Synopsis des diatomées de Belgique (1880).

To commemorate the 100th anniversary of his death, the National Botanic Garden of Belgium an international symposium on all aspects of diatom taxonomy was organised. In this meeting, about 60 diatom specialists from Africa (South Africa), America (Canada, Mexico, Puerto Rico, United States), Asia (India, Iran, Japan), Australia, Europe (Belgium, Bulgaria, Czech Republic, Croatia, France, Germany, Italy, Luxemburg, Netherlands, Poland, Portugal, Russia, Switserland, United Kingdom) gather together to discuss new insights in diatom taxonomy ranging from traditional taxonomic studies, floristics, species diversity, life cycle studies, phytogeography to molecular and phylogenetic studies.



PROGRAMME

Sunday August 23rd

National Botanic Garden of Belgium

17:00-19:00
Registration

19:00-21:00
Frustule-breaker reception

Monday August 24th

8.00-9.30	Registration and Coffee Mounting of posters
9.30-9.45	**Opening words** **Prof. Dr. Jan Rammeloo** director of the National Botanic Garden **Bart Van de Vijver** on behalf of the organizing committee
9.45-10.00	**Henri Van Heurck (1838-1909) a remarkable autodidact** Karel Van Camp & Maurice Dorikens
10.00-11.00	**Key-Note lecture: David G. Mann** Discovering diatom species: is a 150 year history of disagreements about species-level taxonomy now at an end?
11.00-11.30	**COFFEE BREAK**
11.30-11.55	**Ecology and taxonomy of *Pseudo-nitzschia* in Lim Bay (northeastern Adriatic Sea)** Zrinka Burić, Sunčica Bosak, Damir Viličić, Koraljka Kralj, Daniela Marić, Petra Peharec & Tamara Dakovac
11.55-12.20	**Valve ultrastructure of *Cavernosa* Stidolph (Bacillariophyta) and its differentiation from related genera** Holger Cremer & Bart Van de Vijver
12.20-12.45	**Three-dimensional imaging of diatom cell ultrastructure with SEM** J. Nelson Navarro
12.45-13.10	**Towards a comprehensive diatom classification: The role of fossils** David M. Williams & J. Patrick Kociolek
13.10-14.30	**LUNCH**

14.30-14.55 **Problematic use of diatom original material in case of *Frustulia* (*Cymbella*) *ventricosa* (Pennales)**
Tsang-Pi Chang

14.55-15.20 **Should an awareness of diatom valve morphogenesis be an integral part of character evaluation and definition?**
Eileen J. Cox

15.20-15.45 **The genus Navicula Bory in ancient basins: *Navicula pontica* stat. nov. and *Navicula parapontica* spec. nov., two misidentified taxa from the Black Sea**
Andrzej Witkowski, Elena Nevrova, Maxim Kulikovskiy & Horst Lange-Bertalot

15.45-16.10 **Taxonomy and diagnosis of *Cyclotella* sensu lato**
Matthew L. Julius

16.10-18.15 **POSTER PRESENTATIONS**

The Grunow collection in the Natural History Museum of Vienna (Austria)
Myriam de Haan & Bart Van de Vijver

New data on the morphology several species *Trinacria* s.l. from Cretaceous and Paleogene sediments
Nina Strelnikova, J. Patrick Kociolek & Elisabeth Fourtanier

Dominant species of the genus *Actinocyclus* Ehrenberg from the Miocene deposits of the Vitim Plateau, Russia
Marina Usoltseva & Galina Chernyaeva

Taxonomical diversity of plankton diatoms in the Neva Bay (the most eastern part of the Gulf of Finland)
Irina Trifonova & Sergey Genkal

An unusual, small naviculoid diatom species from the docks of the Antwerp harbour
Herman van Dam, Adrienne Mertens & Bart Van de Vijver

New species of *Bacteriastrum* (Chaetocerotaceae, Bacillariophyta) in the Adriatic Sea?
Luka Šupraha, Sunčica Bosak, Zrinka Burić, Goran Olujić & Damir Viličić

Taxonomy and biogeography of the diatom genus *Cocconeis* Ehr. associated to the seagrass *Posidonia oceanica* (L.) Delile in the Mediterranean Sea
Maria Teresa Cante, Domenico D'Alelio & Mario De Stefano

Microscopic observations of *Aulacoseira sphaerica* (Héribaud) Simonsen
Colette Cornet & Jacques Dagnelie

Valve morphogenesis in *Surirella*
Masahiko Idei, Tsuyoshi Watanabe & Shigeki Mayama

Analysis of the type material of small European *Surirella* species present in the Van Heurck collection
Horst Lange-Bertalot, Christine Cocquyt, Luc Ector & Bart Van de Vijver

Using mathematical models to investigate pore formation in diatom valves
Lisa Willis, Karen M. Page, David Broomhead & Eileen J. Cox

Preliminary phylogenetic analysis of Cymbellales from sequences of the 18S rRNA gene
Lenaïg Kermarrec, Luc Ector, Agnès Bouchez, Frédéric Rimet & Lucien Hoffmann

A new enigmatic araphid diatom genus from the Brazilian Amazon (Rio Negro Basin)
Carlos E. Wetzel, Luc Ector, Horst Lange-Bertalot, Lucien Hoffmann & Denise de C. Bicudo

Four unknown *Navicula* species from Sweden
Bart Van de Vijver, Amelie Jarlman & Horst Lange-Bertalot

Five new diatom species from the South Shetland Islands, Antarctica
Ralitsa Zidarova, Bart Van de Vijver & Myriam de Haan

A new *Gomphonema* (Bacillariophyceae) from Mediterranean streams
Maria Elena Beltrami, Saúl Blanco, Nicolas Scheidecker, Francesca Ciutti, Cristina Cappeletti, Laura Mancini, Lucien Hoffmann & Luc Ector

Two new freshwater diatom species found in the National Botanic Garden of Belgium
Pierre Compère, Horst Lange-Bertalot & Bart Van de Vijver

18.30-21.00 **DINNER**

Tuesday August 25th

9.30-10.30	**Keynote speaker: Edward C. Theriot** The Diatom Phylogeny: Status and Prospects
10.30-10.55	**Evolutionary relationships in the genus *Pinnularia*** Caroline Souffreau, Heroen Verbruggen, Koen Sabbe & Wim Vyverman
10.55-11.30	**COFFEE BREAK**
11.30-11.55	**Special structures formed during the diatom life cycle** Aloisie Poulíčková & David G. Mann
11.55-12.20	**Biodiversity and cryptic diversity in the marine planktonic diatoms from the Mexican Pacific** David U. Hernández-Becerril
12.20-12.45	**Facultative heterothally in an apomictic *Eunotia*** Pieter Vanormelingen, Victor A. Chepurnov, Koen Sabbe & Wim Vyverman
12.45-14.15	**LUNCH**
14.15	Departure of the excursion in the trail of Henri Van Heurck
15.30	Visit of the Museum of Science of the Ghent University where the historic microscope collection of Henri Van Heurck is kept
18.00	Reception at the Antwerp Town Hall with a guided tour of the historic town hall
19.00-23.00	Diner at your own expense in the Antwerp historic town (see information in the conference bag)

Wednesday August 26th

9.30-10.30	**Keynote speaker: Wim Vyverman** Diatom biogeography: from cosmopolitanism to narrow endemism
10.30-10.55	**Italian diatomists in the XIX and early XX Centuries** Maurizio Battegazzore
10.55-11.20	**COFFEE BREAK**
11.20-11.45	**Observations on the diatom genus *Lampriscus* A. Schmidt** J. Nelson Navarro
11.45-12.10	**On the identity and distribution in Northern Portugal of three *Gomphonema* species currently misidentified as *Gomphonema clevei*** Salomé F.P. de Almeida, Sandra C. Craveiro & António J. Calado
12.10-12.35	**Diatom flora of tropical Australia: high lights and salient features** Jacob John
12.35-13.00	**Reinvestigation of diatom assemblages from Neogene deposits of Primorye (Russia): taxonomy and morphology of selected pennate diatoms** Maxim Kulikovskiy, Horst Lange-Bertalot, Andrzej Witkowski, Sergei Genkal & Katia Grundan
13.00-14.30	**LUNCH**

14.30-14.55 **Distribution and community composition of epipelic diatoms in Tajan River, Iran**
Tahet Nejadsattari, Nahid Masoudian & Asadollah Mattaji

14.55-15.20 **Some aerophilic diatoms from South Africa**
Jonathan Taylor & Leon van Rensburg

15.20-15.45 **Using diatom community structure to assess freshwater reservoirs in South East Queensland, Australia**
Deb Gale, Alistair Grinham & James Udy

15.45-16.10 **Distribution of diatoms in freshwater ephemeral rock pools**
Joshua T. Cooper & Elisabeth A. Bergey

16.10-18.00 **POSTER PRESENTATIONS**

Rare and exotic diatoms in the Duero River basin (NW Spain), with notes on their ecology and world distribution
Luc Ector, Daša Hlúbiková, Cristina Cejudo-Figueiras, Lucien Hoffmann & Saúl Blanco

The genus *Neidium* in Sweden
Amelie Jarlman, Paul Hamilton & Bart Van de Vijver

A comparative case study: benthic diatoms from streams running through zinc mining areas in Continental (Canada) and Mediterranean (Portugal) climates
Ana Luis, Salomé F. P. de Almeida, Alexa Alexander, Joseph Culp & Eduardo Ferreira da Silva

Diatom flora of transitional water bodies in Latium coast - central Italy
Camilla Puccinelli, A. Zedde, S. Ciadamidaro, S. Marcheggiani, V. Della Bella & L. Mancini

Diatoms of the genus *Stauroneis* on different type springs in Central Poland
Joanna Zelazna-Wieczorek

Epilithic diatoms from two rivers in the Strouma River basin, Southwestern Bulgaria
Ralitsa Zidarova

The diatom flora of Lake Kyaninga, a freshwater crater lake in Western Uganda
Christine Cocquyt, Dirk Verschuren & Pierre-Denis Plisnier

Cymbelloid diatoms from aerial habitats in the Gokyo Valley, Everest (Sagarmatha) National Park, Nepal
Ingrid Jüttner, Smriti Gurung & Bart Van de Vijver

The diatom genus *Gomphonema* in India: Checklist, new species and phylogenetic relationships of the freshwater cymbelloid and gomphonemoid diatoms.
B. Karthick, J. Patrick Kociolek, M.K. Mahesh & T.V. Ramachandra

Study of Surirellaceae family of diatoms and their relationship with some of physicochemical variables of water in Tajan river, Iran
Nahid Masoudian, Taher Nejadsattari & Asadollah Mattaji

***Eunophora* in Western Australia and Queensland**
Jacob John

Eocene nonmarine diatoms from northern Canada
Peter A. Siver, Alexander P. Wolfe & Mark B. Edlund

Epizoic diatoms on freshwater turtles: a new *Luticola* species from the Rio Negro Basin (Central Amazon, Brazil)
Carlos E. Wetzel, Bart Van de Vijver & Luc Ector

The genus *Eunotia* in the Antarctic Region
Horst Lange-Bertalot & Bart Van de Vijver

The genus *Microcostatus* in the Antarctic Region
Bart Van de Vijver, Myriam de Haan & Ralitsa Zidarova

The diversity of *Hantzschia* species on Livingston Island (The South Shetland Islands, Antarctica)
Ralitsa Zidarova, Bart Van de Vijver & Myriam de Haan

Typification of *Staurosira construens* Ehrenberg: type for the name of the genus *Staurosira* Ehrenberg
Paul B. Hamilton & Regine Jahn

18.15-18.30 **Closing session**

18.30-22.00 **FRUSTULE CLOSING BBQ**

ABSTRACTS

The abstracts are arranged in alphabetic order according to the first author's last name. The order is independent of whether the presentation is oral or a poster, which is indicated on the side. The presenting author is underlined and his/her e-mail is printed below the authors list.

Key note speakers for the conference are:

David G. Mann
Discovering diatom species: is a 150 year history of disagreements about species-level taxonomy now at an end?

Edward C. Theriot
The Diatom Phylogeny: Status and Prospects

Wim Vyverman
Diatom biogeography: from cosmopolitanism to narrow endemism

Oral

Italian diatomists in the XIX and early XX Centuries

Maurizio Battegazzore
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Arpa Piemonte, Italy

Searching for literature on early findings of *Didymosphenia geminata* in Italy, it was apparent how some outstanding diatomists in Italy during the XIX and early XX Centuries have largely been forgotten, but deserve to be remembered for their taxonomical and ecological studies on Diatoms. Some of them are included here; others are not listed only for reasons of space.

An early personality involved with diatoms was Giuseppe Meneghini (1811-1889), a professor in Padua (later Pisa) University, who published the first Italian treatise on Diatoms, Sulla animalità delle diatomee e revisione organografica dei generi di diatomee stabiliti dal Kützing (1846).

Towering above others is Count Abbey Francesco Castracane degli Antelminelli (1817-1899) who renounced a religious career for the sake of science and Diatoms, in a period in which the study of fossil, marine and freshwater Diatoms were generally connected. Among his numerous achievements are the first applications of microscopic photography, the study of diatoms from the HMS Challenger expedition (1873-1876) describing 3 new genera and 225 new species.

An important figure with vast scientific interests is Giovanni Battista De Toni (1864-1924), professor of Botany at the University of Modena. Among his numerous works is the imposing 6 volume Sylloge Algarum, including Diatoms.

An eminent and dynamic scientist was Rina Monti Stella, the first Italian woman to achieve a professorship, teaching several disciplines in different Universities. Her wide range of interests included alpine lake studies and Diatoms. She helped set the bases for modern limnology in Italy. Pupil and friend of De Toni and expert in Algae (including Diatoms) was Achille Forti (1878-1937). His 14 works published as Contribuzioni diatomologiche are important. The Botanical Museum in Padua now preserves his collections of 100,000 macro-algae and 7900 Diatom slides from many countries in different continents.

Piero Giaj-Levra (1880-1946) from Piedmont studied law but soon turned to Diatoms, his real interest. His published works (1923-1928) include the inventories of Diatoms in Piedmont, several alpine valleys and coastal areas.

It can be said that following Giaj-Levra a "dark age" of diatom studies in Italy began, with a "rebirth" occurring only in recent decades thanks to Prof. Dell'Uomo in Camerino University.

The generosity and dedication of these pioneer Diatom scientists is an example for us all. The negative effects of insufficient public support for continual scientific research (such as work on basic Diatom taxonomy) remain a lesson for all times.

Poster

A new *Gomphonema* (Bacillariophyceae) from Mediterranean streams

Maria Elena Beltrami[1], Saúl Blanco[2], Nicolas Scheidecker[3], Francesca Ciutti[1], Cristina Cappeletti[1], Laura Mancini[4], Lucien Hoffmann[5] & Luc Ector
mariaelena.beltrami*(a)* iasma.it

[1] IASMA – Fondazione E. Mach, Italy
[2] University of León, Spain
Conseil Général des Alpes-Maritimes, Direction Ecologie et Développement Durable, Service Eau et Milieu marin, France
[4] National Institute of Health, Italy
[5] Public Research Centre - Gabriel Lippmann, Luxembourg

A new benthic diatom species of the genus *Gomphonema* is described with light (LM) and scanning electron microscopy (SEM) observations. Valves have a clavate shape; striae are slightly radial, the central ones being shorter than the others. One stigma and two to four stigmoids are present in the central area. Only the central stigma is easily resolvable with LM. SEM analyses revealed that striae have double rows of bean-shaped areolae. The central stigma opens in the internal side of the valve as a slit in the central nodule, while the stigmoids located around the central area are only externally visible. In connective view, an uninterrupted line of punctа is present on the valve mantle.
This new *Gomphonema* was collected as part of the epilithic diatom assemblages of three calcareous and oligo-mesotrophic Mediterranean watercourses: Farfa stream (Central Italy), Bevera and Paillon streams (South-Eastern France). This taxon seems to prefer alkaline waters with average to high electrolyte content. Along Farfa stream it was present throughout the whole year, more abundant in winter, with a maximum relative abundance of 4%, while in the French sites it was less than 2%. The most common diatom taxa associated were *Achnanthidium minutissimum*, *A. pyrenaicum*, *Amphora pediculus*, *Cocconeis euglypta*, *C. pediculus*, *Cymbella excisa*, *Gomphonema olivaceum*, *G. pumilum* var. *elegans*, *Nitzschia fonticola*, *N. dissipata* and *Rhoicosphenia abbreviata*.

Oral

Ecology and taxonomy of *Pseudo-nitzschia* in Lim Bay (northeastern Adriatic Sea)

Zrinka Burić[1], Sunčica Bosak[1], Damir Viličić[1], Koraljka Kralj[1], Daniela Marić[2], Petra Peharec[1] & Tamara Đakovac
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University of Zagreb, Croatia
Rudjer Boskovic Institute, Croatia

Planktonic diatom species of *Pseudo-nitzschia* group are common in oceanic and neritic plankton worldwide. Since several *Pseudo-nitzschia* species have been known as producers of domoic acid, a neurotoxic amino acid responsible for Amnesic Shellfish Poisoning (ASP), considerable scientific interest on its ecology and taxonomy has been generated.

The taxonomy and ecology of the diatom genus *Pseudo-nitzschia* was investigated in 10 km long embayment in the north eastern Adriatic Sea in the period from March 2002 to July 2008. Water samplings for physico-chemical and biological variables were conducted several months per year at three stations along the bay. The phytoplankton was dominated by diatoms throughout the year with minimum species diversity in summer and maximum in autumn. *Pseudo-nitzschia* spp. was present in 59 % of the samples with abundance up to 1.5 x 106 cells L-1.The maximum abundance of *Pseudo-nitzschia* was in autumn, when it contributed up to 69% of the total diatom abundance. The timing of *Pseudo-nitzschia* blooms suggests nutrient stimulation, since the blooms co-occurred with highest concentration of phosphorus and nitrogen. The low Si:N rations in autumn may favour the growth of *Pseudo-nitzschia* over other diatoms due its lower silica requirement.

Since the toxicity is species specific, morphological analysis has been done revealing five different species, four of them known as potentionaly toxic. In August 2007 dominant *Pseudo-nitzschia* species corresponded to *P. cuspidata*, *P. calliantha* and *P. multi*, in October the same year *P. calliantha* dominated the community, while in February 2008 *P. fraudulenta* and *P. pungens* were identified.

Poster

Taxonomy and biogeography of the diatom genus *Cocconeis* Ehr. associated to the seagrass *Posidonia oceanica* (L.) Delile in the Mediterranean Sea

Maria Teresa Cante[1], Domenico D'Alelio[2] & Mario De Stefano[1]
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Posidonia oceanica is a marine phanerogam endemic of the Mediterranean Sea, where it produces dense matte on sandy bottoms with unsteady hydrodynamic conditions, from shallow waters to 40 meters depth. *Posidonia oceanica* leaves represent an optimal surface of colonization for a complex epiphytic community encompassing both macroalgal and microalgal species. Epiphytic microalgae on *P. oceanica* are mainly represented by pennate diatoms. Differences in the geographic distribution of the host plant act mainly on the species composition of the epiphytic diatom community. Indeed, in term of functional classes or growth forms, this community seems to be represented by a well-circumscribed group of diatom genera that can be considered adapted to the epiphytic life-habitus. Several genera belonging to monoraphid (e.g. *Cocconeis*, *Achnanthes*, *Campylodiscus*) and araphid (e.g. *Licmophora*, *Synedra*, *Fragilaria*) diatoms represent the primary encrusting component of epiphytic community. To this component it is also associated a motile, casual component more variable in terms of genera and characterized mainly by biraphid diatoms (e.g. *Mastogloia*, *Navicula*, *Amphora*). Despite to its crucial ecological role in the trophic chain, the diversity of the diatom community epiphytic on *P. oceanica* leaves and on seagrasses in general is poorly studied and greatly underestimated. Within the epiphytic diatom community of *P. oceanica*, the genus *Cocconeis* can be considered one of the most relevant in terms of species diversity and quantitative abundance. In the present work, species and intraspecific taxa belonging to the genus *Cocconeis* have been identified and described in 19 diatom communities epiphytic on *P. oceanica* from selected Mediterranean areas. The fraction of *Cocconeis* specimens within the total diatoms, their species diversity and the relative abundance of each species have been analyzed in each sampled locality. Furthermore, the diversity of *Cocconeis* assemblages in the different Mediterranean basins have been compared in order to identified potential biogeography pattern in the Mediterranean specie distribution.

Oral

Problematic use of diatom original material in case of Frustulia (*Cymbella*) *ventricosa* (Pennales)

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This contribution presents findings regarding the misleading typification of *Cymbella ventricosa*. In 1827 Carl Adolf Agardh named a small sized diatom with a ventricose form from his 1825 collection at Carlsbad (now Karlovy Vary, Czech Republic) as "*Frustulia ventricosa*". Three years later he changed the name into "*Cymbella ventricosa*". Without checking Agardh's typus material, Kützing (1833, 1844) applied the same name to a similar diatom in his collected samples. Following Rabenhorst's definition (1853, 1864), Grunow in Van Heurck (1880, pl. 3, fig. 15 legend) also refered to Kützing's classification of Cymbella ventricosa and supposed Agardh's description to be in fact a small form of *Rhopalodia*. This interpretation subsequently led to the change of the name "*Cymbella ventricosa* Agardh" earlier to "*C. ventricosa* Ktz." and later to "*C. minuta* Hilse ex Rabh." (Reimer in Patrick & Reimer 1975), "*Encyonema minutum* (Hilse in Rabenhorst) D.G.Man" or „*E. ventricosum* (Agardh) Grunow" (s. Krammer 1997). It is argued that this change of name is based on an imprecise incorrect examination of the type material (only by LM). A reanalysis of the original material using a SEM was conducted. The problematic of this typification process is discussed.

Poster

The diatom flora of Lake Kyaninga, a freshwater crater lake in Western Uganda

Christine Cocquyt[1], Dirk Verschuren[2] & Pierre-Denis Plisnier[3]
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[2] Ghent University, Belgium
[3] Royal Museum for Central Africa, Belgium

Lake Kyaninga is a deep crater lake situated at an altitude of 1530 m asl on the shoulder of the Edward-George extension of the East African Rift Valley, Western Uganda. It has a surface area of 24 ha, and is enclosed by a crater catchment of 42 ha with maximum rim height of 77 m above the lake surface. Lake Kyaninga is among the 48 Ugandan fresh crater lakes studied in the CLANIMAE project (Climatic and anthropogenic impacts on African ecosystems). These lakes represent a productivity gradient from oligotrophic to hyper-eutrophic (natural as well as anthropogenic), and their modern diatom flora is studied in order to make a diatom-based inference model for the past trophic status of East African lakes.
Permanently stratified with a maximum depth of more than 220 m and Secchi-disk transparency between 3.9 and 6 meter, Lake Kyaninga is among the least productive crater lakes of western Uganda. In August 2008 a chlorophyll *a* content of 5.2 µg/l was measured in surface waters. Quantitative phytoplankton analyses of the pelagic zone during the dry season in August 2008 and during the wet season in April 2009 showed that diatoms contribute only a minor part of the total phytoplankton biomass in this lake during the studied periods: in August 2008 only 0.9 % of the total biomass, in April 2009 at the surface 2.0 % and 1.3 % at 10 m depth. *Nitzschia fonticola*, *Ulnaria acus* and *Urosolenia* sp. were the dominant species. Analysis of the sub-fossil diatom assemblage preserved in offshore surface sediments (upper 5 cm) gives a good representation of the annual pelagic diatom community of Lake Kyaninga in recent years. It is composed by a *Pseudostaurosira brevistriata* - *Nitzschia fonticola* assemblage in the upper first cm, switching to a ***Pseudostaurosira brevistriata*** - *Achanthidium minutissimum* - *Cyclotella* cf. *stelligera* assemblage in the next four cm. *Nitzschia frustulum*, comprising several morphotypes, is also fairly important. Diatom species richness in the surface sediments is moderate, about 75 taxa. Only a small number of the diatom species inhabiting Lake Kyaninga have a distribution restricted to tropical Africa: *Nitzschia bacata*, *N. confinis*, *N. congolensis*, *N. epiphytoides*, *N. lancettula*, *N. tropica*, *Rhopalodia gracilis* and *R. rhopala*.

Poster

Two new freshwater diatom species found in the National Botanic Garden of Belgium

Pierre Compère[1], Horst Lange-Bertalot[2] & Bart Van de Vijver[1]
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During a survey of a small freshwater pond located in the middle of the Herbarium building of the National Botanic Garden of Belgium, two new species belonging to the genera *Eunotia* and *Encyonopsis* have been found. The small pond is entirely enclosed by the Herbarium building and is only connected to the outer world by the air, forming thus a very isolated environment.
In 6 samples, taken from different microhabitats in the pond, a fairly diverse diatom flora was found, composed of 63 taxa. The species composition is dominated by eutraphentic species such as *Amphora pediculus* and *Navicula radiosa*, although oligo- to mesotraphentic species such as *Cymbella cymbiformis* and *Encyonopsis subminuta* were also present.
The new *Eunotia* species, *Eunotia belgica* sp. prov., is related to *E. glacialifalsa* Lange-Bertalot but can be separated based on its valve dimensions (larger valve width and number of striae), the absence of the characteristic longer cell cycle stages of *E. glacialifalsa* and a different striation pattern.
The new *Encyonopsis* species, *Encyonopsis horticola* sp. prov., belongs to the *E. microcephala* (Grunow) Krammer complex but can be differentiated from the other species of this complex by a combination of valve outline, striation pattern and areolae structure.
The poster presents briefly the sampling location and illustrates both new species based on detailed LM and SEM observations and compares the new species with known species worldwide.

Oral

Distribution of diatoms in freshwater ephemeral rock pools

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Because granite rock pools are a harsh environment for most aquatic life, diatoms living in rock pools habitats may be specialists – or not. Our objectives were to inventory rock pool diatom communities, and relate community composition to spatial, physical, and chemical variables. We sampled 20-30 rock pools at each of three geographically isolated granite outcrops in southern Oklahoma. An outcrop of rock pools from eastern Georgia was also added as a distant out-group. We also sampled variables of pool morphology and water chemistry, and recorded spatial coordinates. Rock pools were strongly dominated by species of *Stauroneis*, *Hantzschia*, *Luticola* and *Pinnularia*, which comprised almost one-half of the 90+ species. Most of the remaining species were rare. Some species do not fit known descriptions and a few are known primarily from arctic habitats. Whether these species are arctic forms raises questions about the historical processes for their occurrence in very different climates. The three outcrops are distinguished by differences in the relative abundance of a few common species and by presence or absence of rare species. Rock pool diatom communities include specialists, tolerant species, and accidentals.

Poster

Microscopic observations of *Aulacoseira sphaerica* (Héribaud) Simonsen

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Aulacoseira sphaerica (Héribaud) Simonsen were found by the authors in core samples of the boring NO II made by Leroy & Seret (1992) in upper Pliocene freshwater maar sediments in Nogaret (Escandorgue, south of France). Héribaud in 1903 described for the first time this species from Ceyssac (Massif Central, France) as *Melosira sphaerica*.

Valve morphology and ultrastructure of this species were investigated using light and scanning electron microscopes to clarify its taxonomic position.

The diameter of the frustules ranges from 20 to 30 µm. They are composed of two hemispherical silica valves joined by a hyaline cingulum. The valve mantle has straight pervalvar rows, about 12-13 in 10 µm. Each row is composed of slit-like areolae, 10 in 10 µm. The height of a row is about 6 µm. The valve face is covered with irregularly spaced coarse circular or oval areolae, these being occluded by a cribrum.

Loseva (1980) found spherical frustules in the upper Pliocene deposits from the locality Omara (Russia) in the Kama river basin. She identified them as *Aulacoseira sphaerica* (Hérib.) Simonsen. But the smaller dimensions of the frustules (14-20 µm) and the ornamentation she mentioned differ from the Héribaud's description, by the fact that the areolae maintain the same diameter on the valve surface as well as on the mantle. She wrote that *Aulacoseira sphaerica* according to Héribaud "(…) is most probably the spore of an Aulacosira that is either extinct or does not form spores in recent waters."

Our observations point out that the spherical frustules observed in Nogaret correspond quite to Heribaud's description and figures and define initial cells of an *Aulacoseira* according to the terminology of Round et al. (1990) and not a (resting) spore. This initial cell is always found solitary, without vegetative cells. This is the main raison why these initial cells *Aulacoseira sphaerica* cannot accurately identify the species of *Aulacoseira*.

Due to the differences from Loseva's description, its distribution area cannot expand to the Kama river basin and remains considered as an upper Pliocene fossil endemic of the south of France.

Oral

Should an awareness of diatom valve morphogenesis be an integral part of character evaluation and definition?

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The diversity of diatom valve ultrastructure has significantly expanded the amount of available morphological information on many taxa and revealed intriguing variation between specimens that appeared similar under the light microscope. But it also raises several questions. What is the taxonomic significance of this diversity? Which characters are informative, and how should we define them?

Most taxonomic judgements are inevitably based on the morphology of mature valves, and morphological characters are defined and interpreted on their appearance in such valves. This in turn supports an intrinsically static concept of valve structure, not taking account of how particular features might be generated, or whether their formation is susceptible to modification (or failure), depending on the environment in which they develop.

This talk will present information on the morphology and morphogenesis of a variety of raphid diatoms, and discuss how an awareness of morphogenetic patterns may lead to the re-evaluation of character descriptors and its potential systematic significance. Increasing awareness of morphogenetic processes can work in opposing directions, on the one hand, morphological differences may be over-emphasised and taxa split unnecessarily, but on the other, under-estimating the significance of apparently slight morphological differences may have kept discrete taxa together.

Oral

Valve ultrastructure of *Cavernosa* Stidolph (Bacillariophyta) and its differentiation from related genera

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The genus *Cavernosa* is recently known only from two locations: Kapiti Island off the westcoast of New Zealand and Ile de la Possession (Crozet Archipelago) in the southern Indian Ocean. *Cavernosa kapitiana*, the only species in this genus, is a chain-forming diatom with cylindrical frustules having an elongated valve mantle. Living cells contain a high number of small discoid plastids. The valve face is either concave or convex, and areolae are irregularly scattered on the valve surface. One irregular ring of spines is located around the valve margin. The valve interior is subdivided into marginal caverns, a feature that gives the genus *Cavernosa* its name. A rimoportula is usually located in or near the valve center. Globular frustules likely represent initial cells of *C. kapitiana*.
In scanning electron microscope, the valve face areolae are irregularly shaped and often surrounded by a raised rim. Areolae are usually embedded in a formation of silica ridges. The valve center is often covered by small globules. The marginal spines are of a stellate type. The opening of the rimoportula is externally indicated by its oval shape. Internally, the labiate process is a short-stalked rimoportula. Fultoportulae were not observed in *Cavernosa*. Initial cells have a globular shape and a comparably short mantle. The valve face of initial cells is often covered by raised plates from which the areolae emerge. The valve interior is thoroughly (not just marginally!) subdivided into caverns. In many initial cells (all?) two rimoportulae are located halfway the valve center.
We also studied the morphological features that differentiate the genus *Cavernosa* from related genera of *Melosira* s.l. (*Orthoseira*, *Ellerbeckia*, *Melosira* and *Paralia*). An emended genus and species description of *Cavernosa kapitiana* is presented.

Oral

On the identity and distribution in Northern Portugal of three *Gomphonema* species currently misidentified as *Gomphonema clevei*

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Gomphonema specimens with wide axial area in streams of Northern Portugal were examined by light and scanning electron microscopy. Three species were found, identified as *G. rhombicum*, *G. uniserhombicum* and *G. ibericum*. No specimens were found with the features of *G. clevei* sensu stricto, and previous records from the region with the latter name are regarded as representing one or a mixture of the three species examined herein. The three species differed in fine details of the striae, double alternating puncta in *G. rhombicum*, slit-like with irregular outlines in *G. uniserhombicum* and single or divided slit-like puncta in *G. ibericum*. Differences in size and shape of the valve and axial area allow discrimination of at least medium-sized to large specimens of the three species. *Gomphonema rhombicum* was the most common species, sometimes occurring as dominant in the epilithon. Both *G. uniserhombicum* and *G. ibericum* were found more sparsely and always in communities containing *G. rhombicum*. All species were found in slightly acidic to circumneutral, well-oxygenated waters with low conductivity, poor in nutrients and with low organic content.

Poster

The Grunow collection in the Natural History Museum of Vienna (Austria)

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The renowned Austrian diatomist Albert Grunow (1826-1914) donated in 1912 his Algea collection to the "Naturhistorischen Hofmuseum", nowadays known as the Natural History Museum of Vienna (Austria). In 1901, he had already given his diatom collection to the museum. This historically important collection contains samples of raw material from all the corners of the world, 3000 microscopical slides and maps with sketches, drawings and copies of drawings that were published in various works.

Grunow held a close correspondance and collaboration with his fellow diatomist Henri Van Heurck and he contributed greatly to Van Heurck's publications "Synopsis des Diatomees de Belgique" (1885) and "Traité des Diatomées" (1899). His accurate drawings of the diatoms are an essential part of these important works.

A herbarium visit of two weeks was made to the Natural History Museum in order to learn about managing a collection such as the Grunow collection. First steps were made to link the Grunow (W) and Van Heurck (BR) collection. Neither one of these collections is digitalized. During the visit the type material of about 50 taxa of the genus *Navicula* described by Grunow and published in the "Synopsis" were photographed using the light microscope and the accompanying notes were digitalised.

The first four piles of the drawings, comprising taxa of *Navicula*, were studied. Many drawings are missing from the collection; they have been cut out and used in various publications. Most of the cut outs were located in the drawing collection of Van Heurck.

The poster acts as a guide and gives useful pointers for researchers who wish to study the Grunow collection.

This work was supported by a EU Leonardo da Vinci Mobility grant the Daubenton Project: Mobility scheme for managers of scientific collections.

Poster

Rare and exotic diatoms in the Duero River basin (NW Spain), with notes on their ecology and world distribution

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During a diatom survey performed in the Duero River Basin (NW Spain) in summer 2004 and 2005 several diatom taxa considered in the literature as rare, exotic or invasive for European freshwaters (*Achnanthidium catenatum*, *A. rivulare*, *A. subhudsonis*, *Capartogramma crucicola*, *Diadesmis confervacea*, *Eolimna comperei*, *Hippodonta pseudoacceptata*, *Gomphoneis eriensis* var. *variabilis*, *G. minuta*, *Gomphonema lagenula*, *G. pumilum* var. *rigidum* and *Reimeria uniseriata*) were found. Some of them are new records for the Spanish flora, and their absence in modern checklists may indicate their recent introduction in the Iberian Peninsula. Others are found in relatively large numbers and/or widely distributed, reflecting a somewhat invasive ecological behaviour. The environmental singularities of the Duero Basin are hypothesized as the main factor leading to the acclimatization and dispersion of these exotic algae. Measured physical and chemical variables in the sampling stations provide environmental data for the inference of the autoecological profile of these species. Additionally, updated data on their world distribution are given. The ecological relevancy of the presence and proliferation of these diatom taxa in the Duero Basin is discussed. Additionally, the diatom *Didymosphenia geminata*, commonly considered a taxon restricted to pristine habitats in mountainous areas of circumboreal regions, has recently appeared in several stations in northern Spain, and now forms large growths in rivers such as the Revinuesa River (Duero Basin), where it is considered an aggressive invasive species with dramatic ecological and economic impacts. This nuisance organism grows attached in streambeds and may impact freshwater fish, aquatic plants and insects, causing severe disturbance in food webs.

Oral

Using diatom community structure to assess freshwater reservoirs in South East Queensland, Australia

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South East Queensland is home to over 2.7 million people and is one of the fastest growing urban areas in the developed world. For the past 7 years the region has received below average rainfall which resulted in the states capital being only 12 months away from running out of drinking water supply. This resulted in a restructuring of the water supply organisations and infrastructure during 2007/08. S. E. Qld now has the largest water authority (Seqwater) in Australia with twenty-three surface storages contributing to the supply network for the region. To improve management of these reservoirs a rapid assessment of their condition was conducted to determine the trophic status of all storages and evaluate their potential impact on water treatment requirements. Comparisons between water quality and the diatom community present in key reservoirs were made during February 2009 (summer) to develop a diatom indicator of storage condition. Sediments collected from each reservoir were treated with H2O2 and mounted on permanent slides using Naphrax for light microscopy analysis and coated with platinum for scanning electron microscopy analysis. Typically planktonic diatoms Cyclotella spp and Aulacoseira spp were present in all reservoirs, however the dominant species varied between reservoirs. The only reservoir where the dominant diatom was Navicula spp was Cooloolabin which is also unique in water chemistry and the least disturbed storage in the region. The diatom community for each reservoir from this study was compared to existing diatom indexes (including the tropic diatom index and the generic diatom index) to assess the feasibility of adapting an existing index to the region. This study improves the scope of freshwater diatoms studied in Australia as these studies have traditionally focussed on temperate regions, and also provides Seqwater with a valuable tool to assess reservoirs in the future.

Poster

Typification of *Staurosira construens* Ehrenberg: type for the Name of the genus *Staurosira* Ehrenberg

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Samples from Christian Gottfried Ehrenberg's Collection were studied for the taxon *Staurosira construens* Ehrenberg. Since Ehrenberg did not designate a type for *Staurosira construens* at the place of its first description, two identified locality from his 1843 America publication had to be evaluated. Examination of the micas and samples from this localities, combined with the unpublished notations and original line drawings allowed us to verify and better circumscribe this taxon and the genus *Staurosira* to which this taxon represents the type species for the genus. A specimen from Ehrenberg's New Haven mica preparation was chosen to serve as lectotype. This study emends the description of the species *Staurosira construens* Ehrenberg within the genus *Staurosira* Ehrenberg.

Oral

Biodiversity and cryptic diversity in the marine planktonic diatoms from the Mexican Pacific

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Recently, and all over the world, a cryptic diversity has been recognized within the marine phytoplankton, which is still unknown in Mexican seas. New techniques, methods, approaches (e.g. molecular tools, technological advances), and concepts and paradigms (e.g. cryptic species, phylogenetic relationships.) are in current use and should be considered to estimate the present diversity of the marine phytoplankton in Mexico. Despite extensive Mexico's littorals in the Pacific Oceans, our knowledge about phytoplankton diversity is still in progress: few taxonomic groups (the so called phytoflagellates), the smaller size-fractions (nano and picoplankton), and some areas are poorly-known (mainly tropical zones) have been poorly-studied. Tropical, subtropical, temperate and more cosmopolitan planktonic floras have been recognized in the marine phytoplankton, and they fluctuate and have intergrades according climatic or oceanographic events. The genera *Chaetoceros*, *Pseudonitzschia*, *Rhizosolenia* and *Skeletonema* provide examples of "cryptic" or "pseudocryptic" planktonic diatom species found in the Mexican Pacific, in the context of the cryptic diversity. Studies on some species of those genera and others too, either from fixed samples or cultures, are given in this paper. New records of planktonic diatoms for the Mexican Pacific are also included, thus indicating the reevaluation of the real biodiversity of the marine phytoplankton.

Poster

Valve morphogenesis in *Surirella*

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A study of valve ontogeny can provide one of the important clues to clarify a diatom phylogeny. The forming valves often demonstrate significant resemblance between higher rank of taxa, even though they look very different in structure of mature valves. Here, we present a valve morphogenesis in two *Surirella* species with a canal raphe system around the perimeter of the valve face.

In *Surirella* there are two types of the valve symmetry, namely isopolar and heteropolar. The raphe slit usually divides into two branches at either pole. The central raphe endings are located at the broader apex of the valve and the terminal endings are at the narrow one in heteropolar species. Ontogenetically the broader end is equivalent to the center of naviculoid diatoms. However, the distinction between the center and the terminal endings of the raphe is uncertain in the mature valves of isopolar species, and it has not been demonstrated in valve morphogenesis also. We pushed forward a study for the purpose of clarifying this point with a high resolution SEM.

We collected heteropolar *S. tenera* from a freshwater pond and isopolar *S. fastuosa* from marine, and cultured them with a modified BBM medium and PES respectively. In both species, various stages of the morphogenesis were observed, which begun from raphe area and developed toward the valve center as well as the mantle margin as reported by previous researchers. However, we found several new facts in the formation of the isopolar valve including an initial valve generated after auxospration. The prominent finding was a horseshoe shaped raphe-sternum with two slits in early developing stage, in which both terminals were not fused. This ontogenetic result indicates that the hoop-like raphe system of *Surirella* is a homologue of the linear raphe system observed in other raphid genera. Subsequently split ends of the raphe sternum were fixed by fusion of virgae extended from both arms of the raphe sternum, and then connected at one pole of the valve as seen in the species with heterpolar valve. A structural difference between both poles caused by the morphogenesis was slightly recognized even in the mature valves. We discuss about the details of valve morphogenesis in both species.

Poster

The genus *Neidium* in Sweden

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The genus *Neidium* is a fairly small Naviculoid genus. The genus is exclusively typical for freshwater habitats and groups mostly species that are characteristic for acidic, oligotrophic waters, often in association with *Frustulia*, *Eunotia* and *Brachysira*. Although widespread, they never form large populations.
Neidium species are most often characterized by having a linear to lanceolate outline, a flat valve face and one or more enclosed longitudinal canals near the valve face mantle junction. The proximal raphe endings are usually deflected or hooked in opposite directions.
During a survey of the lotic diatom floras of Swedish rivers, a large number of Neidium species has been found such as *N. densistriatum*, *N. hitchcockii*, *N. septentrionale*, *N. bisulcatum* or *N. longiceps*. Detailed light and scanning electron microscopical analyses has revealed the presence of several unknown, probably at present undescribed species, closely related to well-known species such as *Neidium ampliatum* or *N. dubium*. This poster gives an overview on one hand of all *Neidium* species found in Swedish rivers and on the other hand focuses on some of the unidentified species. Whether they represent new species is still unclear.

Oral

Diatom flora of tropical Australia: high lights and salient features

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As the first part of the diatom flora project of Australia sponsored by the Australian Biological Resources Studies, Government of Australia, the taxonomy and distribution pattern of diatoms in tropical Australia has been completed and currently under print. Collections of samples made over the past 28 years including intense surveys over the past 8 years have been examined using light and electron microscopy. The study covered the state of Queensland, Northern Territory (the top end), Christmas Island and the tropical and subtropical inland regions of Australia.
The tropical and subtropical regions of Australia can be characterised by weather patterns-temperature, humidity and rainfall. The northern parts of Australia from Carnarvon in Western Australia to Brisbane in Eastern Australia ranging in climate from hot humid summer with high rainfall to the regions south with arid climate are covered in this study. The transition from wet tropic to dry semiarid to arid inland Australia is accompanied by dominance of genera such as *Mastogloia* and *Amphora*. Within the tropical regions there are interesting aquatic habitats such as hot springs ,fast flowing rivers prone to flooding and wetlands with wide seasonal changes.
Species of *Navicula*, *Nitzschia*, *Eunotia*, *Encyonema*, *Cymbella* and *Stenopterobia* are wide spread and dominate the tropical inland aquatic systems. The pattern of distribution follows the rain fall and temperature. There are distinct assemblages separating rivers and lakes.
The diatom genus Eunophora described from Tasmania and New Zealand has been recorded from Queensland for the first time. There are distinct differences in assemblages between those of Northern territory and Queensland. For example the genus Pleaurosira is found only in Queensland and not in Western Australia or Northern Territory. Similarly *Eunotia zasuminensis* –a planktonic diatom of doubtful generic status was found only in the Northern Territory and not in Queensland.
The relations between the diatom flora of tropical Australia and temperate regions of Australia and other proximal tropical geographical regions are discussed in this paper

Poster

Eunophora in Western Australia and Queensland

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The genus *Eunophora* was described by Vyverman. W, et al in 1998 from Tasmania and New Zealand. With an Amphoroid frustule profile, this genus shares some features with *Eunotia* and is considered endemic to the southern hemisphere. Within the four species described under this genus, considerable variations can be found . The frustule structure and distribution pattern of this genus in Queensland, have been investigated. The genus is very rare in Queensland.

In the southwest of Western Australia, this genus was recorded by the author in 1998 as an *Amphora*. South-western Australia has some of the most pristine streams and native forests in Australia and considered one of the hot spots of plant diversity. The species is identified as *Eunophora tasmanica*.

Recent investigations on lake sediment cores of fresh water wetlands in Perth have found this species or a species closely resembling *Amphora obtusa* was very common in the remote past. Examining lake cores dated up to 50, 000 years, this genus was found to be common and disappeared probably within the last 1000 years in most of the fresh water lakes even though the last live specimens were collected about 16 years ago from a freshwater lake in the Perth region. The structure and distribution of the genus is traced through examination of core samples from two lakes.

Oral

Taxonomy and diagnosis of *Cyclotella* sensu lato

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Cyclotella has undergone considerable revision over the last twenty years. Modifications have included the designation of a conserved type for the genus and the splitting out of numerous species into new genera. It has also been demonstrated that the group is not the product of a single freshwater invasion, but rather contains species descended from two disparate marine ancestors. Taxonomic modifications have not been made with an understanding of this ancestry or any other systematic data. Additionally, numerous authors have contributed to revisions of the genus with little interaction among one another. These factors have produced a collection of species difficult to diagnose, that do not appear to form a logical hierarchy delineating genera. An understanding of the systematic relationship of species among one another does, however, allow a logical hierarchy to be developed. In this study, the taxonomic status of species belonging to *Cyclotella* sensu stricto is presented. Additionally, diagnostic features useful for identification of genera and species are presented. In all cases, these features represent homologous characters reflecting the group's evolutionary history. Consideration of morphological data in this context reveals many recently described genera represent grades of transitional species rather than distinct groups. Discussion of which genera represent clear species groups and those more difficult to justify will be presented in context of systematic and nomenclatural validity. Information from this study should lay the foundation for an efficient and effective taxonomic system for species traditionally included in the group.

Poster

Cymbelloid diatoms from aerial habitats in the Gokyo Valley, Everest (Sagarmatha) National Park, Nepal

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In October 2008, an ambitious three-years project began aiming to investigate the impacts of pollution and climate change on the biodiversity of aquatic habitats in the upper Gokyo Valley, located in the Everest National Park, Nepal. One of the principal components of this project is the analysis of the diatom flora in the Gokyo lakes, streams and associated wetland habitats. During the analysis of samples taken from aerial habitats such as wet soils, terrestrial bryophytes and rock faces a well-developed diatom flora was observed. Dominating diatom groups include *Eunotia*, *Pinnularia*, *Fragilaria* s.l. (including *Staurosira* and related genera), *Achnanthes* s.l. and especially *Cymbella* s.l. Analysis of the latter group revealed the presence of more than 20 taxa belonging to *Encyonema*, *Encyonopsis*, *Cymbella* s.s., *Cymbopleura* and a so far undescribed genus. Based on light microscopical and electron microscopical investigations, it is clear that several taxa cannot be assigned to already described taxa.
This poster gives an overview of the cymbelloid species diversity with a special focus on the unidentified taxa. Whether the latter represent new species is still unclear.

Poster

The diatom genus *Gomphonema* in India: Checklist, new species and phylogenetic relationships of the freshwater cymbelloid and gomphonemoid diatoms

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We report on the diversity of the freshwater diatom genus *Gomphonema* Ehrenberg in India. A checklist of the previously reported species of the genus from India reveals a total of 103 taxa, of which 35 are endemic to the country in particular to Western Ghats. We also describe three new species from the Central Western Ghats, Karnataka State of India. All three species have distinctly dilated proximal raphe ends, in addition to differentiated apical pore fields, septa, pseudosepta and a round stigmal opening. *Gomphonema gandhii* nom. prov. is linear-lanceolate-clavate, has a wide axial area, and is 19-51 µm long, 3-7 µm broad. *Gomphonema difformo* nom. prov. is smaller than *Gomphonema gandhii*, and has a hyaline area around the headpole. *Gomphonema diminutais* nom. prov. much smaller and more narrow than the other two species. These species are distinct from their closest congeners by their sizes, shape and structure of the headpole, and striae densities. We assess the phylogenetic position of the new species within the clade of freshwater gomphonemoid and cymbelloid diatoms. We also appraise the ecological profile of three new species with respect to water quality and seasonal population structure. This study attempts to reveal the clues of active speciation in *Gomphonema* in the Western Ghats, one of the global hot spots of biodiversity.

Poster

Preliminary phylogenetic analysis of Cymbellales from sequences of the 18S rRNA gene

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In order to use diatoms as indicators of the ecological quality of running waters, a better knowledge of the taxonomy of species inhabiting rivers is necessary. Many species belonging to the order Cymbellales are often widely represented in freshwater benthic samples. However, several taxa groups are difficult to identify under light microscopy. The phylogenetic relationships of species classified within these orders are not always clear because their taxonomic status has been regularly subjected to changes. Monoclonal cultures were obtained from populations of benthic diatoms collected from rivers in Italy, Luxembourg, Portugal and Spain, and the sequences of 18S rDNA of several taxa have been determined and compared to the sequences available in GenBank. The strains were also studied by light and scanning electron microscopy to assess the most important morphological criteria to separate species and genera. Our results confirm the classification proposed by Round et al. (1990) for these orders of the class Bacillariophyceae. According to the sequences obtained from strains belonging to the Cymbellales, three main groups (A, B, C) can be distinguished. Group A comprises sequences of strains belonging to the genera *Cymbella*, *Didymosphenia*, *Gomphoneis* and *Gomphonema*. All the strains of the group A isolated during this study, classified as Cymbellaceae and Gomphonemataceae, are characterized by a common raphe structure and by the presence of apical pore fields. Group B contains only strains of the genus *Encyonema*, characterized by the absence of apical pore fields and distal raphe ends curved towards the ventral side. Group C includes representatives of the genus *Reimeria* but also of the genera *Gomphonema* and *Placoneis*. All strains of group C possess apical pore fields and lack striation in the centre of one side of the valve. These results suggest that the genus *Gomphonema* might be paraphyletic. This study showed the importance of a polyphasic approach combining morphological with molecular data in order to improve diatom taxonomy and classification system together with their reliability as bio-indicators.

Oral

Reinvestigation of diatom assemblages from Neogene deposits of Primorye (Russia): taxonomy and morphology of selected pennate diatoms

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In this report we revise the diatom assemblages from Neogene deposits in Russia. Freshwater Neogene deposits are widespread in the Primorye Region (Far East of Russia). Diatom assemblages from these deposits were studied by A.I. Moiseeva in 1960' and 1970's. Moiseeva has described a number of new species and intraspecific taxa which were published by Sheshukova-Poretzkaya, Moiseeva (1964) and by Moiseeva (1971). Here we report results of our LM and SEM studies on the original samples which have been study subject of Moiseeva. In our revision we attempt to update the taxonomy of diatoms which were described either as new species or infraspecific forms. As a result a series of transfers to genera which resulted from split of large catch all genera like *Navicula* s. l. and *Fragilaria* s.l. is proposed. New taxonomic combinations, "status nova" based on modern taxonomic concepts are proposed and these specifically concern species representing *Aulacoseira* Thw., *Tetracyclus* Ralfs, *Fragilariforma* Williams & Round, *Eunotia* Ehr., *Placoneis* Mereschk., *Pinnularia* Ehr., *Cymbella* Ag. s. str. and *Gomphonema* Ag. Special focus of our study is species representing *Frustulia* Ag. In addition we discuss morphology of the tripolar taxa which apparently represent *Fragilariforma*.

Poster

The genus *Eunotia* in the Antarctic Region

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The diatom flora of the Antarctic Region is currently under revision using a narrower species concept resulting in the differentiation of a large number of species from their European and American relatives. One of the genera that at present still needed a revision is *Eunotia*.

The genus Eunotia is a well-known diatom genus with species present on all continents of the world. Most members of this genus have very narrow ecological tolerances and prefer oligo- to dystrophic, acid aquatic conditions although a lot of species also form a dominant component of the bryophilic diatom flora. Currently in Europe, more than 100 taxa are known but worldwide, the diversity is very large, especially in South America.

In the Antarctic Region, the diversity is much lower although in the past more than 75 taxa (including varieties, forms and species) have been reported from the entire Region (Kellogg & Kellogg 2002). In the present study, all our observations from the southern Indian and Atlantic Oceans are being reanalysed using light (LM) and scanning electron microscopical (SEM) features. The observed diversity is relatively low despite the fact that suitable habitats are quite available. The poster illustrates the different taxa that have been found during this survey and discusses their morphology and possible taxonomic position. Whether some of them represent new species or should be attributed to already known taxa is still unclear. Biogeographically, there seems to be a clear separation between the localities in the two oceans although some taxa tend to occur in the entire Antarctic Region such as *Eunotia paludosa*.

References:

KELLOGG T.B. & KELLOGG D.E., 2002. Non-marine and littoral diatoms from Antarctic and subantarctic regions. Distribution and updated taxonomy. Diatom monographs 1: 1-795.

Poster

Analysis of the type material of small European *Surirella* species present in the Van Heurck collection

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In 1987, Krammer and Lange-Bertalot analysed a first part of the Pinnatae group in *Surirella*, discussing the most common taxa such as *Surirella ovalis* Brébisson, *S. angusta* Kützing and *S. minuta* Brébisson. Based on the examination of the type material, present in the Van Heurck collection in Antwerp (Belgium), both authors described *S. brebissonii* and its variety *kuetzingii* and put several species described by William Smith in synonymy with *Surirella minuta* such as *S. pinnata*, *S. apiculata* and *S. salina*.
In 2006, the entire Van Heurck collection was moved to the National Botanic Garden of Belgium, facilitating the diatom research based on this collection. Recently, several *Surirella* forms were found in northern and central Europe that showed affinities to the *S. minuta* complex and the discussion on the exact identity of *S. minuta* raised again.
The present poster shows all small *Surirella* species belonging to this *S. minuta* complex, based on light microscopic observations of the type material present in the Van Heurck collection. In addition, species described later such as *S. brebissonii* are also depicted. Each species is accompanied by its original description. The results of this study will later be used in a large revision of this complex.

Poster

A comparative case study: benthic diatoms from streams running through zinc mining areas in Continental (Canada) and Mediterranean (Portugal) climates

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Two geographically distinct zinc mining areas were studied, one located in Bathurst - New Brunswick, Canada and another one in Aljustrel - Alentejo, Portugal, with different geological and climatic characteristics.
Brunswick mine is a base metal (Zn-Pb-Cu) mine located in Northern New Brunswick, near Bathurst city. Water quality in Little River downstream mine is characterized by periodic low pH conditions (pH < 3.5) due to oxidation of thiosalts. Zinc concentrations in the river were elevated relative to typical natural background. The mining complex of Aljustrel is located in the Iberian Pyrite Belt (IPB) that corresponds to an area of Devonian-Carboniferous volcanic and sedimentary rocks containing massive sulphide deposits.
The aim of this study was to compare diatom communities from streams running through two zinc mining areas separated by the Atlantic Ocean.
Four sites were selected from each of the streams (sites 1 to 4 were located in Água Forte stream - Aljustrel and sites 5 to 8 in Little River - Bathurst) respectively. Both streams were acidic, but pH was slightly lower in the Portuguese stream, varying between 1.90 (site 1) and 2.90 (site 3). In the Canadian stream, pH varied from 2.18 (site 6) to 5.46 (site 5). Metals with the highest concentrations were common in both streams: Al, Cu, Fe, Mn, Zn and sulphates, although in Little River concentrations were lower than in Água Forte stream. Sites 1, 2 (Aljustrel) and 6 (Bathurst) were the most problematic: the highest metal concentrations and lowest pH.
The dominant diatom in Água Forte stream was *Pinnularia acoricola* whereas in Little River all sites showed a set of Eunotia species (e.g. *Eunotia exigua* and *Eunotia arculus*) which dominated and in sites 5 and 6, *Brachysira vitrea* and *Frustulia saxonica* dominated, respectively.
We can conclude that despite the differences found in the composition of diatom communities in the two zinc mining areas geographically distant and geomorphologically distinct, both were dominated by acidobiont and acidophilous taxa, making pH the main driving force for diatoms.

Oral

Discovering diatom species: is a 150 year history of disagreements about species-level taxonomy now at an end?

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Although diatoms were discovered at the beginning of the 18th century, description of species did not begin in earnest until the 19th century, particularly in the works of F.T. Kützing, C.G. Ehrenberg, L. Rabenhorst and W. Smith. In these, no infraspecific taxa were described. It was recognized that individuals within a species differed in shape and size, but this was not thought to challenge the reality of species as discrete entities, each definable by a unique set of morphological characteristics. Smith sometimes acknowledged the existence of one or two common variants within particular species and referred to them using a single Greek letter (β, γ). The causes of variation were sometimes discussed and partly attributed to the effects of the environment or to changes brought about during the sexual phase, which was not properly understood at the time. Following publication of Darwin's 'The Origin of Species' 150 years ago, there seems to have been a gradual shift towards formal recognition of named infraspecific taxa, beginning in monographs by A. Grunow between 1860 and 1885. Subsequently, huge numbers of 'varieties' and 'forms' were described in the late 19th and early 20th centuries and there was increasing disagreement about the ranking of taxa, the many demotions and promotions being based on authors' perceptions of the importance of particular characteristics and whether variation appeared to be continuous or discontinuous. Studies of ontogenetic changes during the life cycles of diatoms by L. Geitler and H.A. von Stosch were particularly important in providing a basis for interpreting variation.
The prevailing paradigm for 80 years after 'The Origin of Species' was that, because evolution is a continuous, gradual process of divergence, all levels of differentiation are to be expected, from differences in one or a few traits among individuals in a population, to more marked correlated differences in several characteristics between ecological or geographical races, to unmistakable and unbridged chasms of difference between major groups of organisms. Given this evolutionary framework, species appeared to have no particular unique status, being merely less inclusive than genera and more inclusive than subspecies, varieties or forms. In the 'New Synthesis' paradigm developed by T. Dobzansky, E. Mayr and G.L. Stebbins in the 1940s, on the other hand, species occupy a unique position in the taxonomic hierarchy because they mark where a genetic hiatus develops between groups of organisms: restriction of gene flow prevents evolutionary novelties being shared between populations, and is supposed to allow populations to diverge and lead

inevitably to clear, correlated discontinuities in several or many characteristics. These ideas were reflected succinctly in the various definitions of the 'biological species concept'. The application of similar ideas to diatoms did not take place until the 1970s, when it was suggested by K. Bonik and H. Lange-Bertalot that the complexities of variation and apparent intergradation in genera such as *Nitzschia* might reflect interbreeding among the 'species' recognized by previous authors. This remains a possibility, but subsequent studies of mating among other raphid diatoms (notably *Sellaphora* and *Pseudo-nitzschia*) has shown that traditional species boundaries can also greatly underestimate the partitioning of the gene pool. This discovery coincided with (and may have influenced) a major change in diatom alpha taxonomy, involving recognition of many more species. Use of molecular markers has also encouraged the idea that diatoms are under-classified at the species level.

At present, there seems to be a largely unacknowledged and unanalysed consensus among diatomists, whether they rely entirely on valve morphology or use additional sources of data, that there are many more diatom species to be discovered. Some of these 'new' species will have been seen for many years but have remained 'hidden' within existing species, because the variation pattern was examined insufficiently carefully or with blunt taxonomic tools. Others will be discovered in habitats and regions that have hitherto remained relatively unexplored, especially in the marine benthos. No data-type should have a monopoly in the process of species discovery. Testing and calibrating approaches via model systems is important and can facilitate practical application of a consensus species concept like that advocated by De Queiroz (2007). However, description, illustration and typification of species, both old and new, and dissemination of taxonomic information, all remain major and worsening problems that must be addressed urgently in the perverse context of dwindling expertise and increased demand from users. Solutions will probably involve DNA barcoding and greatly expanded use of Web-based iconographs and floras, and possibly also changes to the nomenclatural rules for diatoms.

Poster

Study of Surirellaceae family of diatoms and their relationship with some of physicochemical variables of water in Tajan river, Iran

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Tajan river is amoung significant rivers of Caspian sea water basin. This river originates from Alborz mountains and is comprised from three main streams of Tajan, Zaromroud and Sefidroud. This river is the most important source of water for agriculture and economic purposes in Sari (Mazandaran province). Therefore study about the microorganisms in this river is very important for water quality determining. Diatoms are the major constituent flora in aquatic ecosystems such as freshwater habitats. In this study diatoms were sampled at ten sampling stations at monthly intervals from March 2007 through February 2008. Samples immediately fixed with formaldehyde 4% msitu. For exact recognition, permanent mounts were prepared by using Patrick & Reimer procedure. Identification of diatoms were done by means of light microscope and specialized recognition keys. For study of diatom communities in aquatic ecosystems, counting method is used because in this method identification and determination of diatom communities and morphological variations of species are better known. Simultaneously physicochemical variables were measured (Temperature, EC, pH, DO, BOD, COD, TDS, Na^+, K^+, Ca^{2+}, Mg^{2+}, Cl^-, SiO_2, NO_3^-, NH_4^+ and SO_4^{2-}). In this research 7 species identified in Surirellaceae family. Two way Indicator Species Analysis (TWINSPAN) and Canonical Correspondence Analysis (CCA) revealed that *Surirella angustata*, *S. robusta* and *Cymatopleura solea* were indicator species for water pollution.

Oral

Observations on the diatom genus *Lampriscus* A. Schmidt

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The genus *Lampriscus* was validly published by A. Schmidt in 1882, Atlas Diat. T. 80, fig. 11. Since then, several authors described it under different genera: *Triceratium*, *Biddulphia*, *Trigonium*; new species, varieties and forms were created with a lot of synonyms. Hustedt (1927-1930), discussed some of the problems associated with *Triceratium shadboltianum*. Hendey (1971) also described taxonomic problems, considering that the genus was described and illustrated by Peragallo (1898-1908), p.389, pl.106, fig.1. He revived *Lampriscus* describing *L. shadboltianum* var. *elongatus* (Grunow) Hendey, saying: "it would be impossible to find forms more remote in structure from *Triceratium* or *Biddulphia*". Navarro (1981) also restored this genus in his Puerto Rico papers, as Ricard (1987) comments, both authors recommended that further studies are necessary in order to resolve the generic limits and relocate *Lampriscus*. Round et al. (1990), said: "species concepts in this genus still require detailed study and we are not certain of its taxonomic position". After literature revision and on basis of materials studied with LM and SEM from marine waters from Puerto Rico and Guam, taxonomic recommendations are proposed, separating genus *Lampriscus* from those related genera.

Oral

Three-dimensional imaging of diatom cell ultrastructure with SEM

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In diatoms, taxonomy is based primarily on the characteristics of the silicified frustule. SEM provides sufficient depth of focus to permit interpretation of the three-dimensional structure.
These observations help to explain the complicated distribution and forms of some delicate projections: setae, spines or processes, such as rimoportulae or fultoportulae; ocellus or pseudocellus; type of striae; areolae, pseudoloculus, and external o internal views of frustules with or without raphe. All of those are important for students and professors. Several examples of diatoms *Podosira*, *Actinocyclus*, *Chaetoceros*, *Bacteriastrum*, *Thalassiosira*, *Triceratium*, *Mastogloia*, etc. and methods to obtain these images will be presented. Red-blue glasses will be provided by author for obtaining the three-dimensional effect.

Oral

Distribution and community composition of epipelic diatoms in Tajan River, Iran

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Temporal and spatial variation of physicochemical characteristics of lotic waters is features that affect epipelic diatom communities. In this study epipelic diatoms were sampled at ten sampling stations at monthly intervals from March 2007 through February 2008. At each sampling occasion triplicate samples were gathered from sediments using a core device. Species were identified and density and relative abundances of dominant populations were determined. Simultaneously physicochemical variables were measured (Temperature, EC, pH, DO, BOD, COD, TDS, Na^+, K^+, Ca^{2+}, Mg^{2+}, Cl^-, SiO_2, NO_3^-, NH_4^+ and SO_4^{2-}). Multivariable analysis of data was applied in two different approaches. First, sampling units and species were grouped using tow way Indicator Species Analysis (TWINSPAN). Second, Canonical Correspondance Analysis (CCA) was applied in order to evaluate changes in species composition. Classification analyses using TWINSPAN resulted in 5 groups from 109 samples. *Gomphonema olivaceous* was differential for group A, whereas *Cymatopleura solea* was differential for group C, *Cocconeis placentula* and *Cymbella gibba* for groups D & E, respectively. The study revealed that species diversity decreased toward downstream.

Oral

Special structures formed during the diatom life cycle

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Diatoms are unusual among algae in being diplontic and having a solid bipartite silica frustule. In almost all species the life cycle consists of two principal phases – vegetative division, accompanied by size reduction, and auxosporulation (mostly following sexual reproduction), which results in size restoration.
Multipartite structures, containing both organic and silica components, are produced by diatoms to protect the expanding auxospores and help control their development. The different kinds of structures produced discriminate major lineages, genera or even species, but few species have been studied in detail and some new variants were discovered only recently.
The isodiametrically expanding auxospores of phylogenetically old lineages of centric diatoms are generally covered by silica scales. By contrast, expansion of most pennate diatoms is bipolar and accompanied by production of perizonia comprising longitudinal and transverse elements. The transverse perizonium is a complex silica structure composed of complete or split rings. Sometimes the auxospore tips are covered by mucilaginous (*Navicula*, *Luticola*) or silicified (*Veidium*) caps. Both cap types represent primordial protection of the early zygote and appear a few hours after gamete fusion, preceding creation of the perizonium. Recently, scale-like structures have been discovered in the primordial zygote envelope in *Sellaphora* and the *Veidium* caps have been reinvestigated using SEM. We will discuss whether it is the silicified caps, or the perizonium, or both, that are homologous with the scale case of centric diatoms and with the extraordinary systems of fine silica strips in the incunabula of *Pinnularia* and *Nitzschia*.

Poster

Diatom flora of transitional water bodies in Latium coast - central Italy

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Diatoms are one of the biological quality elements recommended by the Water Frame Directive (WFD, 2000/60/EC) for the assessment of the ecological status of surface waters. Transitional ecosystems are included among these water bodies. Actually, diatom flora of Italian Mediterranean water bodies is poorly known, also due to the fact that an ecological monitoring system based on diatoms has not been implemented yet.

The aim of this work is to describe diatom communities of transitional water bodies in littoral zones of Latium, and to provide a first implementation of the Directive requirements on these ecosystems. The study area includes 7 transitional sites: 4 located on natural streams and 3 on artificial canals. Sampling was performed according to EN 13946 (2003) and identification and counting of diatom species according to EN 14407 (2004).

Diatoms communities are mainly composed by freshwater species. The most abundant identified species are *Luticola nivalis*, *Nitzschia capitellata*, *Nitzschia incospicua*, *Nitzschia frustulum*, *Nitzschia constricta*, *Navicula gregaria* and *Surirella brebissonii* (typical species of eutrophic waters) for natural river sites. *Brachysira aponina*, *Bacillaria paradoxa*, *Nitzschia sigma* (typical halophile species), *Nitzschia constricta*, *Navicula recens* and *Surirella brebissonii* were the most common species found in artificial canals.

The Principal component analysis (PCA) indicates that some species are closely associated with each transitional water type, and their distribution mainly depends on nutrient and chloride contents: pollution tolerant species (*Luticola goeppertiana*, *Mayamaea atomus*, *Navicula subminuscula*) in river mouths, and both pollution tolerant and halophilous and marine littoral species in artificial water body mouths (*Amphora coffeaeformis*).

Diatoms communities differentiate for geology, typology and degree of human impacts.

The results of this study can be considered useful both to increase the knowledge on diatom communities from these particular and neglected aquatic ecosystems and to improve diatomic datasets available for the Mediterranean ecoregion in the implementation of WFD.

Poster

Eocene nonmarine diatoms from northern Canada

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Siliceous microfossils abound in lake sediments deposited in the Giraffe kimberlite diatreme, a Middle Eocene maar situated in the Northwest Territories of Canada. The lake persisted between the time of kimberlite emplacement at 48 Ma and final paludification at 40 Ma, as constrained by 87Rb/87Sr and fission-track ages. An exploration drill core taken from the crater in 1999 contains 113.1 m of organic sediment, including 44.8 m of peaty material underlain by 68.3 m of stratified lacustrine sediment, in many places finely laminated, and rich in siliceous microfossils. Overall, microfossils representing the Chrysophyceae and Synurophyceae dominate samples from the lacustrine facies. Despite the overwhelming abundance of chrysophytes, an astonishing diversity of diatom lineages is also present, including the orders Thalassiosirales, Aulacoseirales, Fragilariales, Tabellariales, Eunotiales and Naviculales. We present details concerning the ultrastructure and stratigraphic distributions of representatives of the genera *Cyclotella* s.l., *Aulacoseira*, *Fragilaria* s.l., *Oxyneis*, *Eunotia*, *Nupela* and *Pinnularia*. The complement of thalassiosiroid genera (*Cyclotella*, *Discostella*, *Puncticulata*) extends the antiquity of the fultoportula, and implies that the Thalassiosirales lineage is considerably older than previously thought. Species of *Aulacoseira*, with morphological affinites to modern taxa, dominate sections of the core corresponding to deep-water deposition, implying some degree of ecological stasis within this group. As observed throughout the material, the ultrastructure of the araphid diatom species is also directly comparable to modern taxa. The genus *Eunotia* became established as the lake transitioned to a more shallow and acidic waterbody. One of the observed morphotypes of *Eunotia* has a raphe spanning more than 80% of the valve length and a distinct hyaline central area between the proximal raphe endings, suggesting greater raphe development in certain ancient *Eunotia* relative to modern counterparts. The presence of *Eunotia*, along with *Nupela* and *Pinnularia*, further establish that nonmarine biraphid diatoms as a whole are more ancient than previously believed, dating to at least 45 Ma. Collectively, the exquisitely preserved microfossils from the Giraffe Pipe core have enhanced our understanding of freshwater diatom evolution as a whole, and provide valuable new mileposts to discipline molecular phylogenies.

Oral

Evolutionary relationships in the genus *Pinnularia*

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Pinnularia is one of the most species-rich diatom genera and comprises a large number of morphological forms, on the basis of which several attempts have been undertaken to subdivide the genus. Despite these attempts, the phylogenetic relationships inside *Pinnularia* are still unclear however. Moreover, the evolutionary relationship with its sister genus *Caloneis* has since long been ambiguous, and many authors consider *Caloneis* to be a part of *Pinnularia*. To obtain insight into the evolutionary relationships in the genus and their congruence with valve morphology, we determined rbcL chloroplast gene and LSU rDNA sequences of 57 strains from 30 morphospecies of *Pinnularia* and Caloneis. Molecular analyses were performed with model-based methods (Maximum Likelihood and Bayesian Inference). Morphological analyses are in progress and focus on i) the raphe-complexity, ii) the degree of openness of the inner side of the alveoli, and iii) the central part of the raphe, which are supposed to be the most important distinctive traits for the different morphological groups in Pinnularia. We also consider other morphological characteristics such as valve outline however. In the molecular phylogenies, *Pinnularia* and *Caloneis* form a monophyletic group, clearly separated from the outgroup *Sellaphora*. The different *Caloneis* species are scattered in between the *Pinnularia* species, indicating that *Caloneis* as a genus – as currently circumscribed – should be abandoned. Several subgroups with high bootstrap support can be outlined for both molecular markers, being a "viridis-viridiformis" group, an "acrosphaeria-nodosa" group, a "subgibba-subcapitata" group, a "borealis"group, and a "microstauron" group. The relationships between these large groups are still unclear, and should be further investigated using morphology and a concatenated phylogeny based on both molecular markers.

Poster

New data on the morphology several species *Trinacria* s.l. from Cretaceous and Paleogene sediments

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Species of *Trinacria* s.l. (including most part of species *Triceratium* s.l.) are dominant in Upper Cretaceous and Paleocene floras. About 500 species of this group are known from Cretaceous and Paleogene, but only a small number have revised, resulting in the new genera Sheshukovia Gleser, Lisitzinia Jouse, and Medlinia Sims. The main problem is the diagnosis of the genera and their systematic positions relative to one another. We present new data on the morphology of several *Trinacria* species, providing new and very important infomraiton for the understanding of the classification and evolution of this group.

Russian Fond of Fundamental Research (Grant 09-04-00025a) supports this work.

Poster

New species of *Bacteriastrum* (Chaetocerotaceae, Bacillariophyta) in the Adriatic Sea?

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This study reports on ecology and description of *Bacteriastrum* sp. (Chaetocerotaceae, Bacillariophyta) which dominated phytoplankton assemblages in the survey done in the coastal eastern Adriatic Sea. The investigated area is the 40 km long and 4-14 km wide system of Pag and Velebit Channel extending parallel to the coast. The inner part of the Velebit Channel is extended into the karstic Zrmanja River estuary while the outer end communicates with the open sea through Pag Channel and Kvarneric strait. The area is extremely oligotrophic with limited riverine input of nutrients.

Water samples were collected at 7 stations along the coast during November 2008 in order to analyze the phytoplankton composition and its relation to environmental conditions. The nutrient concentration was generally low and its wide range confirmed existence of the trophic gradient in this system. Concentration of phosphate varied from 0.001 to 0.1 µmol L^{-1}, total inorganic nitrogen from 0.85 to 7.0 µmol L^{-1}, while silicate concentration ranged from 0.3 to 15.4 µmol L^{-1}. The high Redfield ratio (31 – 3180) indicated strong phosphorus limitation in the area. Total of 80 microphytoplankton taxa were identified. The most abundant groups were diatoms with maximal abundances, from 7.3 x 10^{3} cells L^{-1} at the most oligotrophic, up to 9.6 x 10^{4} cells L^{-1} at the least oligotrophic stations. *Bacteriastrum* sp. contributed to the phytoplankton community in more oligotrophic stations with abundances up to 9.8 x 10^{3} cells L^{-1} (92% of total microphytoplankton) while on more eutrophic stations its abundance was 6 x 10^{2} cells L^{-1} (1% of total microphytoplankton). Morphological analysis has shown that the dominating *Bacteriastrum* resembled solitary species *B. parallelum* but the size was different as well as orientation and morphology of setae. Unlike colonial *Bacteriastrum* species adjacent cells were distant from each other (15-25 µm) forming "chains" with up to 25 cells while their setae did not connect or fuse.

Our observations indicate the possibility of observing a stage in the life cycle of some other *Bacteriastrum* species since additional analysis of net samples revealed presence of three true colonial *Bacteriastrum* species (*B. furcatum*, *B. hyalinum*, *B. mediterraneum*) or discovering yet undescribed species from this genus.

Oral

Some aerophilic diatoms from South Africa

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The terrestrial and aerophilic diatom flora of South Africa has received very little attention in the past. However, brief investigations by workers such as FR Schoeman revealed interesting and diverse species inhabiting these environments. Several terrestrial and aerial habitats were chosen for study. These included arid soils of the North-West Province, sandy soils in the Mpumalanga Province and the Clarence Sandstone formations of the southern Free-State province.

Studies of the different types of soils revealed the presence of three new species of the genus *Microcostatus*. These taxa were ornamented with unique structures, such as conopea, which are not typical for this genus.

The investigated diatom flora of the sandstone formations occurred together with *Vostoc* spp. The communities contained several species from the genera *Amphora* and *Navicula* s.l. already described by FR Schoeman. In addition, a naviculoid species with a cruciform, often asymmetrical, valve shape was also discovered. A species from the genus *Denticula* was also present and its identity is uncertain.

These studies as yet have only revealed a small part of the diversity of the aerophilic diatom species of South Africa. It still remains to investigate the material collected by previous workers whole recorded *Navicula* (*Microcostatus*) *krasskei* from various localities, this material most probably represents other taxa, either known or unknown to science.

Oral

The Diatom Phylogeny: Status and Prospects

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This presentation will briefly review the traditional, eclectic approaches to diatom classification and phylogenetic inference since the time of Van Heurck, and review inferences and insight gained from analysis of the SSU. SSU phylogenies have resulted in various highly incongruent inferences depending on taxon sampling and inference method used. Until recently, SSU analyses predominately returned a result in which centries with a radial orientation of structure graded into centries with bipolar or multipolar structural orientation which themselves graded into pennate diatoms. Some recent hypotheses, however, have proposed that each of these groups was monophyletic. However, SSU has recently been shown to be unlikely to be able to resolve these competing ideas with any degree of robustness. Some morphological characters may speak to resolution of some uncertainties in the SSU inferred phylogeny. In particular, "soft" anatomy of the diatoms remains unknown for the vast majority of diatoms, but seems to align taxa in much the same way as the SSU data. The greatest amount of existing molecular data besides SSU has been gathered from the rbcL gene. Most *rbc*L data has been gathered in studies of ordinal and lower taxa. Our lab has added *rbc*L data, seeking to fill in obvious gaps. Results are promising, although the *rbc*L trees returned to date do not reflect either traditional classifications or the SSU trees. Evidence points to low signal to noise in the *rbc*L rather than some fundamental bias. This low signal to noise may be overcome by the addition of genes and taxa as well as data manipulations that lower data noise more than signal.

One of the more surprising results to date has been the grouping of the Thalassiosirales in the bi- and multi-polar centrics. Such apparent conflicts between traditional classifications and molecular systematics are frequently discussed, but less frequently discussed are groupings which do not conflict with tradition, but rather seem to have an absence of morphological support. Such gaps may be explained by rapid radiations akin to saltation events. Likewise, there is broad congruence between biostratigraphic distributions of diatoms and molecular phylogenies, but long ghost lineages are implied. Moreover, there are notable long gaps in the fossil record itself. Together this implies that at least some of the gaps may reflect large gaps in taxon sampling.

The next century will see the use of entire genomes in phylogenetic inference. There are already examples in higher animals of the use of these data to infer large scale phylogenies, and already cautionary tales that such data are themselves not a panacea. In particular, taxon sampling remains an issue. A major challenge to diatomists of the 21st century will be to integrate these new technologies with traditional explorations of diatom diversity, and to formally integrate the apparent high number of extinct taxa that would appear to occupy the basal and middle of the diatom tree.

Poster

Taxonomical diversity of plankton diatoms in the Neva Bay (the most eastern part of the Gulf of Finland)

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The flora of plankton diatoms of the Neva Bay - the inner estuary of the Neva River and the most eastern part of the Gulf of Finland, has transitional character and is completely determined by the Lake Ladoga plankton brought by the Neva. But in western part of the Neva Bay it is also influenced by the Gulf of Finland. The complex of dominat species in the Neva Bay phytoplankton includes fresh-water and brackish-water species, and many species-indicators of eutrophication. Diatoms are dominant group of the phytoplankton community of the Neva Bay but until recently they have not been studied with electron microscopy. This paper describes results of electron microscopy study and provides a revision of Bacillariophyta species found in the Neva Bay plankton. The investigations were based on quantitative and qualitative phytoplankton samples collected in the Neva Bay during 6 surveys in 2005. Phytoplankton was sampled monthly from May to October at 15 stations from the Neva mouth to the flood protection dam. The depth changed at different stations from 1 to 10 m, salinity from 0.2 to 2.4 PSU, P tot from 36 to 60 μg l^{-1}.

Scanning electron-microscopy studies on plankton diatoms from the Neva Bay have revealed 116 taxa of Pennatophyceae from 34 genera: *Achnanthes*-13, *Achnanthidium*-1, *Amphora*-5, *Anomoeneis*-1, *Asterionella*-1, *Caloneis*-1, *Cavinula*-2, *Cocconeis*-4, *Ctenophora*-1, *Cymbella*-2, *Diatoma*-1, *Diploneis*-4, *Eolimna*-1, *Fragilaria*-7, *Geissleria*-6, *Gomphonema*-3, *Gyrosigma*-1, *Hippodonta*-4, *Karayevia*-1, *Navicula*-24, *Naviculadicta*-4, *Neidium*-1, *Nitzschia*-11, *Placoneis*-1, *Planothidium*-1, *Psammothidium*-3, *Puncticulata*-1, *Rossithidium*-1, *Rhizosolenia*-1, *Sellaphora*-2, *Staurosira*-2, *Staurosirella*-1, *Surirella*-2, *Tabellaria*-2; and 30 taxa of Centrophyceae representing 8 genera: *Aulacoseira*-5, *Cyclostephanos*-1, *Cyclotella*-7, *Discotella*-2, *Puncticulata*-1, *Skeletonema*-2, *Stephanodiscus*-9, *Thalassiosira*-3. The complete set of diatoms including species of *Acanthoceras*-1 and *Rhizosolenia*-2, which occur in plankton samples but disappeared after treatment, numbers 147 diatom taxa representing

42 genera. 85 taxa of 24 genera appeared new for the diatom flora of the Neva Bay including 5 species of Centrophyceae (*Cyclotella*-2, *Puncticulata*-1, *Thalassiosira*-2) and 80 Pennatophyceae (*Achnanthes*-11, *Amphora*-4, *Aneumastus*-1, *Cavinula*-1, *Cocconeis*-3, *Diatoma*-1, *Diploneis*-4, *Eolimna*-1, *Geissleria*-6, *Gomphonema*-2, *Hippodonta*-3, *Navicula*-24, *Naviculadicta*-4, *Neidium*-1, *Nitzschia*-5, *Placoneis*-1, *Planothidium*-1, *Psammothidium*-3, *Ros-sithidium*-1, *Surirella*-2), 27 taxa of which were identified only to genus. 26 diatom taxa proved to be rare and 4 taxa- new to the diatom flora of the north-western Russia. Those species include *Achnanthes bahusiensis* (Grunow) Lange-Bertalot, *Hippodonta rostrata* (Hustedt) Lange-Bertalot, Metzeltin et Witkowski, *Placoneis constans* var. *symmetrica* (Hustedt) Cox, *Navicula antonii* Lange-Bertalot. Identification of 60 common species reported earlier was confirmed.

Poster

Dominant species of the genus *Actinocyclus* Ehrenberg from the Miocene deposits of the Vitim Plateau, Russia

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The genus *Actinocyclus* Ehr. from the Upper Miocene deposits of the Vitim Upland is represented by extinct species: *Actinocyclus gorbunovii* (Sheshukova) Moisseeva et Sheshukova, *A. krasskei* (Krasske) Bradbury et Krebs and *Actinocyclus* aff. *tubulosus* Khursevich. The aim of this work is to carry out a detailed study of valves of these species with scanning electron microscopy and to compare the data obtained with the published diagnoses [1].

Valves of *Actinocyclus gorbunovii* are round with a concave or convex center or concentrically undulated, 17-46.5 µm in diameter. There are 16-20 areolae in 10 µm, 16-20 areolae being in each radial row. The central area is small, unstructured or with one or several isolated areolae. Sometimes a hyaline ring is observed on the face valve with scattered areolae and spines. The face mantle is 1-3.8 µm high. The marginal ring of rimoportulae (4-9) is located in the upper part of the mantle. Rimoportulae look like tall tubes with widened ends and a curved slit. There are small round apertures on their outer surface.

Valves of *A. krasskei* are round ranging from flat to concentrically undulated, 17.6-37.5 µm in diameter. There are 14-16 areolae in 10 µm, 14-16 areolae being in each radial row. The central area is often absent or it is quite small with 1-2 isolated areolae. A narrow hyaline ring is on the boundary of the face valve and the mantle or it is absent. The valve mantle is 1.3-4.2 µm. The marginal ring of rimoportulae (4-10) is located in the upper part of the mantle. Rimoportulae look like tubes of an average length with widened ends and arched slit, whereas their outer apertures are small and round.

Valves of *Actinocyclus* aff. *tubulosus* are round with a concave or convex center, 17.7-36.5 µm in diameter. Areolae (16-20) are located in radial rows in 10 µm. In 10 µm of each row there are 16-18 areolae. The central area is small, unstructured or it is absent. The valve mantle is 0.8-2.2 µm high. In the marginal part of the valve face there are 3-4 narrow and short hyaline stripes, at the base of which there are 3-4 rimoportulae on the boundary with the mantle. They look like short wide tubes with straight and slightly curved fissures. Short tubes or rather large widened openings are located on their outer apertures.

The results of our studies show that morphological valve parameters of *A. gorbunovii* from the Miocene deposits of the Vitim Plateau vary in a wider range than those in the diagnosis [1]. Morphological valve parameters of A. *krasskei*, on the whole, coincide with those of the diagnosis [1]. However, they differ in high density of areolae and a large number of rimoportulae. Valves of *Actinocyclus* aff. *tubulosus* are similar to those described earlier, but they differ in a less number of rimoportulae (3-4 versus 3-9) and in the form of their outer apertures. Taking into account the information mentioned above, we propose to enlarge the diagnosis of the studied species.

This work was supported by the Integrated Project of the SB RAS and FEB RAS No. 5, 09-II-CO-08-001.

[1] The diatoms of Russia and adjacent countries. Fossil and recent. (2008). II, 5. (Strelnikova & Tsoy, eds.). 171 pp. St. Petersburg University Press, St. Petersburg.

Oral

HENRI VAN HEURCK (1838 - 1909) a remarkable autodidact

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Henri Van Heurck, born in Antwerp, was a successful and rich manager of a factory of varnishes, paints and other products such as e.g. toothpaste. Due to poor health in his youth, he stayed for long periods in the countryside where he became interested in botany. Although he did not obtain a university degree, his local and international fame came by self-study for his hobbies. His research on diatoms made him world famous.

To study these unicellular organisms one needs an optimal resolution of the microscope. He became an authority in this subject. He produced for the Zeiss Optical Works the necessary microscopical preparations to test their new apochromatic immersion objective.

He was in correspondence with E. Abbe and in recognition for his cooperation, he personally received in Antwerp out of the hands of Roderick Zeiss one of the first three special nA= 1.60 bromnafthalene immersion apochromatic objectives. He designed a special microscope stand for his research on diatoms. Watson & Sons then built the stand. They produced it for 20 years (1890-1910). It was their top model. Van Heurck organized in Antwerp in 1891 an international exhibition on microscopy, the first event of that kind in Belgium.

He published several books, among which the famous "Traité des diatomées". Eventually it was translated in English. In 1960 this English edition was reprinted as a facsimile. The fourth enlarged and last edition (1891) of "Le Microscope" was also translated.

Van Heurck assembled an impressive collection of old microscopes. The collection contains one of the renowned "Leeuwenhoek" microscopes. Besides being the owner of an impressive diatom collection, he bought and expanded a large herbarium known as the Siebert – Von Reichenbach – Van Heurck herbarium.

Locally his reputation was due to his activities as director of the botanical garden, professor of chemistry at the technical school, and as founder and or president of several Belgian and Antwerp learned societies. In January 1896, i.e. about three weeks after Roentgen, he produced the first trials of X ray photos. He pioneered the technique and wrote a practical manual on X rays in1897. He coached also in 1897 the two Antwerp hospitals in setting up their X ray service.

And all these activities were just his hobbies

Poster

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An unusual, small naviculoid diatom species from the docks of the Antwerp harbour

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The Antwerp harbour is one of the largest in the world but contrary to most international harbours, it is located at more than 100 km from the sea and only connected to the North Sea by the river Schelde, resulting in a mixture of fresh, brackish and marine water flowing through the different docks. During an extensive analysis of the diatom flora in 2008, several unknown or so far unidentified taxa were found apart from a large number of well known species typical for both freshwater and brackish-marine condition such as *Diatoma vulgare*, *Navicula lanceolata* or *Asterionella formosa*, *Catacombas obtusa*, *Berkeleya rutilans* and *Thalassiosira angulata*.

One of the unidentified taxa is presented on this poster. It is a small biraphid species bearing several unusual features. The valves are typically slightly domed with the apices pointing downwards. The striae appear uniseriate with alveoli continuing from the raphesternum to the mantle, interrupted at the valve face/mantle junction. Most characteristic are the presence of a small, rounded internal central nodule between the central raphe endings and the presence of a stigma next to this central nodule (visible in SEM on the outside as a small slit and on the inside as a round thickening). The raphe is filiform with simple terminal and central endings. Internally, the areolae are covered with hymenes. The girdle consists of perforated copulae. The valvocopula possesses a enlarged pars interior. It is so far unclear to what genus this species belongs. It could possibly be attributed to the (newly erected) genera *Olifantiella* Riaux-Gobin & Compère or *Labelliciula* Van de Vijver & Lange-Bertalot.

Poster

The genus *Microcostatus* in the Antarctic Region

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The genus *Microcostatus* was erected in 1998 by Johansen & Sray to accommodate a small number of tiny naviculoid species belonging to the former section *Naviculae minusculae*. Species in this genus are characterized by the lack of a conopeum, typical for the genus *Fallacia*, the possession of a simple raphe system and the presence of the typical microcostae, a series of external transapical costae near the axial area. Since the erection of the genus, less than 20 species have been transferred to and described in *Microcostatus* such as *M. krasskei* (Hustedt) Johansen & Sray, *M. zackenbergensis* Van de Vijver et al. and *M. monsviridis* Metzeltin & Lange-Bertalot.

The genus has a worldwide distribution with species present in the northern and the southern hemisphere.

The diatom flora of the Antarctic Region is currently under revision using a narrower species concept resulting in the description of a large number of species, separated from their European and American relatives based on light (LM) and scanning electron microscopical (SEM) features. During a survey of the Antarctic non-marine diatom flora, two *Microcostatus* species were found on several localities in the southern Atlantic and Indian Ocean. Comparison with type material and with the sparse literature that exists on the genus *Microcostatus*, both Antarctic species could be identified as *Microcostatus naumannii* (Hustedt) Lange-Bertalot and *M. macedra* (Schimanski) Lange-Bertalot. Both species show a typical northern distribution although some older records of *M. naumannii* were known from the Antarctic Region.

This poster shows the detailed morphology of both Antarctic *Microcostatus* species and discusses their unusual biogeographical distribution.

Poster

Four unknown *Navicula* species from Sweden

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Recently, an informal, ambitious project was started in order to refresh the taxonomic knowledge of the Nordic freshwater diatoms inhabiting the numerous streams in Sweden, based on diatom counts gathered in the past 20 years, a project that should result in the publication of a volume of Iconographia Diatomologica.
Although the European diatom flora is well studied and European diatoms are regularly used for biomonitoring purposes, a number of unknown taxa belonging to several genera such as *Navicula*, *Cymbella*, *Neidium* and *Geissleria* was found during this survey. Especially within the genus Navicula, several unknown forms were observed that will eventually be described as new species.
The present poster illustrates the four unknown *Navicula* taxa using both light and scanning electron microscopical observations and comparing them with well-known taxa such as *Navicula cryptocephala* Kützing, *Navicula antonii* Lange-Bertalot, *Navicula cryptotenella* Lange-Bertalot and *Navicula seibigiana* Lange-Bertalot. The 4 depicted taxa can be separated from these taxa by differences in striation pattern, raphe system and areolae density.

Oral

Facultative heterothally in an apomictic *Eunotia*

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The typical diatom life cycle involves cell size restitution through the formation of an auxospore following sexual reproduction. However, in several diatoms including both centries and pennates, apomixis or asexual auxospore development, has been reported. To date, little is known about the genetic basis, inheritance and evolutionary significance of this behavior. In a lineage of the *Eunotia bilunaris* species complex, we currently investigate (1) the phylogenetic relationships between apomictic and "normal" heterothallic clones using ITS rDNA, *rbc*L and *cox*I sequences, (2) the possibility of facultative sexual reproduction in apomictic clones, and (3) the inheritance of apomixis. Phylogenetic analysis showed that apomictic and heterothallic clones are very closely related and that two subclades consist of mixtures of apomictic and sexual clones. When crossed with sexual clones, apomictic clones are also capable of forming biparental auxospores, be it at relatively low frequency. Moreover, this progeny proved to be viable and fertile. This is the first time that such behavior has been reported for pennate diatoms, and suggests that apomixis allele(s) may spread through horizontal gene transfer among closely related lineages. The first results of the inheritance analysis, still based on a limited number of 11 clones, indicated that 50% of the progeny resulting from a cross between an apomictic and sexual clone is sexual of one mating type, 25% sexual of the second mating type and 25% apomictic. This suggests that the expression of the apomictic behavior is controlled by the mating type. Prospects to further unravel apomixis in *Eunotia* will be discussed.

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Oral

Diatom biogeography: from cosmopolitanism to narrow endemism

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Already since the 19th century, the close correspondence in morphology of species inhabiting different continents, led scientists like de Candolle and Darwin to conclude that small organisms with a simple body organisation have a cosmopolitan distribution. During the past 20 years, extensive and detailed morphological and molecular studies have demonstrated that for most aquatic invertebrate species provincialism rather than cosmopolitanism is the rule. However, in the case of protists and prokaryotes, the prevailing paradigm that 'everything is everywhere but the environment selects' (Baas-Becking 1934) has stood strong and has been advocated most recently as the ubiquity hypothesis by Finlay and Fenchel (Finlay 2002, Fenchel and Finlay 2004). In this presentation I first review recent evidence that challenges this ubiquity hypothesis. I conclude with a look forward of future research topics which may help to understand the immense ecological and evolutionary success of diatoms.

Three lines of evidence indicate that not all diatoms can get everywhere, even if suitable habitats are present.

First, a few taxa – so-called flagship taxa - are morphologically very distinct to the extent confusion with other taxa is very unlikely and that their geographical distribution can be reliably mapped. Several examples of such taxa are known, and many of them have narrow geographical ranges or are confined to (habitat) islands.

Second, multivariate statistical analyses capable of disentangling environmental and spatial effects on taxonomic richness and turnover in community composition permit to quantify the role of dispersal constraints in structuring diatom communities.

Lumping and force-fitting had severe consequences for our understanding of the ecology, diversity and distribution of diatoms, as it not only stretched the morphological boundaries of many species, but also reinforced the idea that most diatom species have cosmopolitan distributions and are ecological generalists. As a consequence, analyses of diatom floras covering large geographical scales will not be possible in the near future. Fortunately, as diatom species diversity scales with genus diversity, large-scale analyses at the genus level may generate hypotheses that can be tested at a smaller geographical scale using species data. Recent analyses of a global diatom dataset consisting of genus-level data, provide strong arguments for dispersal constraints underlying global patterns in genus-richness and turnover in community composition, suggesting that historical geological and climatic events have played a significant role in shaping these communities.

These ideas were recently confirmed by the analysis of a southern hemisphere dataset, which was built following years of fine-grained morphological studies and extensive taxonomic intercalibration. Preliminary analysis confirm the presence of strong gradients in species diversity and show significant turn-over in species composition, indicating a strong regionalization of diatom floras, mirroring those observed in terrestrial invertebrates and angiosperms.

Third, a large number of cosmopolitan morphospecies remains. While many of them probably are species complexes consisting of morphologically very similar species differing in their geographical distribution, for a very few of them detailed multi-method approaches have confirmed that they indeed comprise potentially interbreeding populations of the same widespread species, including for example *Sellaphora capitata* (Mann et al. 2004, 2008) and *Pseudonitzschia pungens* (Casteleyn et al. 2008). Population-genetic studies and physiological data, however, indicate weak gene flow over large geographical distances and/or significant local adaptation which may preclude colonization by maladapted genotypes.

As the appreciation of the geographical structuring of diatom communities grows, water managers, paleolimnologists and conservationists should take into account biogeographical considerations while using diatoms as indicators of the (past) environmental status of surface waters and as a tool for the conservation of surface waters. At the same time, the availability of a growing number of diatom genomes and the expanding toolbox to study diatom biology and physiology, will be essential to understand the huge variation in geographical range size and in particular the processes underlying speciation in diatoms.

Poster

A new enigmatic araphid diatom genus from the Brazilian Amazon (Rio Negro Basin)

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Little is known on the presence of diatoms in tropical inland waters of South America. Recent studies focusing on diatom diversity from the Amazon hydrographical basin have proven to be interesting and all have yielded descriptions of several new species mainly in the genus *Eunotia* Ehrenberg.

As part of a large survey examining diatoms along the Rio Negro Basin (Brazilian Amazon) unusual cells resembling the genus *Eunotia* were found. Based on scanning electron microscopy observations, a particular set of features was observed on this strange diatom such as the absence of a raphe system and rimoportulae. In this context, a new diatom genus is presented.

In internal view, the raphe vestiges and rimoportulae are absent. Areolae are lying crater like, are unoccluded, and without noticeable alveoli-like depressions at the plane internal surface. The cingulum is composed of several 3-5 open or closed copulae that are perforated by pervalvar multiporoid striae. This is known from *Eunotia* and less distinctly from *Hantzschia* but unknown in Fragilariaceae and other araphid families.

The complex of present and absent characters excludes any relation to hantzschioid Bacillariaceae with a canal raphe system. Due to the particular patterns of structures on the girdle band elements, lack of rimoportulae and/or apical pore fields make a close relation to known araphid families rather unlikely. Although it is not yet evident, provisionally a closer relationship to Eunotiaceae may be suggested. The typical *Eunotia* raphe may have been lost or not developed during the phylogenetical speciation. As recently proposed, a hypothesis is that the eunotioid raphe has shortened (degenerated), and not lengthened, over time. Although this new taxon may eventually be placed into a new family, given the current dynamic state of diatom systematic, it is premature to do so at this time. *Eunotia* species with more or less similar outlines are: *Eunotia joaquinii*, *E. reichardtii*, *E.* cf. *undulata* and *E. ventriosa* var. *brevis*.

Poster

Epizoic diatoms on freshwater turtles: a new *Luticola* species from the Rio Negro Basin (Central Amazon, Brazil)

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The present work presents an unusual finding on carapaces of the freshwater turtle *Podocnemis erythrocephala*, captured during an expedition across the hydrographical basin of the Rio Negro (Central Amazon, Brazil). The new species belongs to the genus *Luticola* and was found to be dominant only on all captured turtles (12) whereas in all other samples, the species was absent. This *Luticola* has so far only been found living epizoically on small freshwater turtles (maximum body length 30 cm). The geographic range of these turtles is restricted to the Orinoco and Rio Negro rivers.

Based on its main morphological features, this *Luticola* can easily be separated from all other *Luticola* species. A very unique feature that can be used to distinguish this new taxon is the presence of the thickened valve margins near the apices, giving the idea of small polar caps. Within the genus *Luticola*, this has never been observed. A similar feature is often found in taxa belonging to the genus *Hippodonta*, such as *H. avittata*. A large number of endemic *Luticola* taxa is present in tropical South America but they all show a different combination of morphological characteristics. Several of these taxa show a similar transapically elongated stigma. The most similar *Luticola* species however, is the presumably cosmopolitan *L. goeppertiana*. The latter has a more elliptical-lanceolate outline, larger valve dimensions and somewhat smaller central raphe pores. The main differences are the central area, which is typically asymmetrical in the new *Luticola* while *L. goeppertiana* has a symmetrical central area, and the higher number of areolae per stria (>5) in *L. goeppertiana*. The orientation of the striae near the central area is less radiate in the new *Luticola* species compared to *L. goeppertiana*. Finally, *L. goeppertiana* lacks the typical polar thickenings.

Other South American Luticola species such as *L. peguana* or *L. simplex* have a different (i.e. circular) stigma and a larger number of areolae per stria. In the Antarctic Region, two recently described taxa present a similar valve outline, but both *L. moliakii* and *L. australimmanis* have a different raphe structure and an almost rounded stigma.

Oral

Towards a comprehensive diatom classification: The role of fossils

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At one time it was believed that without reasonable fossil evidence the phylogeny of any group of organisms was almost unknowable. And so fossils were sought, found and their significance duly proclaimed. Such a dominating viewpoint slowly disappeared in the 1970s and 1980s and data derived from the structure of extant organisms was given more attention. At the same time, molecular data became accessible as another source of phylogenetic information and, eventually, it was believed, as it was with fossils before, that without reasonable molecular evidence the phylogeny of any group of organisms is almost unknowable. Justification for this view has been sought in the explanation that, in general, morphology is just a bit too misleading, what with convergences, parallelisms, etc. These same views have come to prevail in diatom phylogenetic studies. A problem with this constellation of viewpoints is that if morphology is so misleading then so too are fossils (which are, after all, morphological specimens). This presentation will address some of these issues, particularly with reference to certain diatom fossil taxa.

Poster

Using mathematical models to investigate pore formation in diatom valves

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Diatom valves are invariably perforated by a regular network of pores whose substructure, while taxon-specific, varies across taxonomic groups. It is therefore usually assumed that pore substructure is genetically controlled during morphogenesis. A variety of cytoplasmic components, such as mitochondria, vesicles, fibres and fibrous material, which can be moved around the cell by cytoskeletal elements, may help to mould the expanding SDV and determine patterns of silica deposition. On the other hand, it has been suggested that intrinsic properties of silica deposition under particular biochemical regimes could generate the type of pore arrangements seen in diatoms.

We are using mathematical and computational models to investigate whether, given an initial silica-based lattice structure, pore substructure is simply a consequence of silica deposition on this lattice. Does the initial shape, and or position, of a pore determine the final configuration of its occlusion? This question is being investigated with particular reference to pore substructure in *Achnanthes* and *Rhaphoneis*.

This poster will illustrate pore structure and development in these diatoms, outline our hypotheses and describe our models, and present some preliminary results.

Oral

The genus *Navicula* Bory in ancient basins: *Navicula pontica* stat. nov. and *Navicula parapontica* spec. nov., two misidentified taxa from the Black Sea

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The Black Sea is a relic basin of an ancient Thetys Ocean which extended from Northern Africa through the Mediterranean, nowadays Caucasus and Himalaya up to the Indonesia. Due to its unique geological history it is inhabited by unique biota including also diatoms. This has been known since the pioneer studies of Mereschkowsky in early XXth century. The next period of intense diatom studies in the Black Sea is dated to 1950' and 1960' and the results were published by Proshkina-Lavrenko. During the last two decades Black Sea benthic diatoms were studied by Guslyakov and co-authors and by Nevrova and co-authors. Despite the above studies, the identification of numerous species of the benthic diatoms in the Black Sea still causes major problems. Studies of the Black Sea benthic diatom assemblages contribute to and increase our understanding of biodiversity and evolution in an ancient marine basin. However, it was only Proshkina-Lavrenko (1955, 1963) to recognize and to understand that the diatom assemblages of the recent Black Sea diatom flora host some ancestral species. This is especially valid for the genus of *Navicula* Bory. Our LM and SEM study is based on original material collected by Proshkina-Lavrenko and the recent material collected by one of the authors.

The Black Sea diatom assemblages are dominated by representatives of this genus. The most updated record lists 53 species (63 infraspecific taxa, Nevrova, Petrov, 2009). It was already Mereschkowsky in his first study of the Black Sea diatoms to notice the occurrence of some possibly endemic *Navicula* species in this ancient basin. One of the taxa described by Mereschkowsky was a variety *pontica* of *Navicula pinnata* (?) (original citation). We suppose that the intention of Mereschkowsky was var. *pontica* of *Navicula pinnata* Pantocsek 1889. Thus it shall be *Navicula pinnata* Pantocsek var. *pontica* Mereschkowsky. Due to unknown

reason this taxon, later on, considered as one of the most abundant forms, existed in species lists under erroneous name *Navicula pennata* A.S.(?) var. *pontica* Mereshkowsky (e.g. Proshkina-Lavrenko, 1963; Gusliakov et al., 1992; Nevrova et. al., 2003). Here we discussed the history of *Navicula pinnata* var. *pontica* and propose a new taxonomic status for this taxon. Our LM and SEM study justify its revision as an independent species i.e. *Navicula pontica* stat. nov. In the course of LM and SEM studies of the Black Sea material we have recorded a series of species which bear a certain similarity to *Navicula pontica* but never been formally separated from the latter species. For one of such species, that was misidentified for a long time as the above discussed Mereschkowsky's taxon we propose a new name *Navicula parapontica* and here formally describe it. The new species can be very clearly differentiated from *Navicula pontica* by the complex of morphological features. Erroneously identified *Navicula parapontica* belongs to the group of the most abundant species in diatom studies of the Black Sea which were performed during the last few decades (summarized by Nevrova et al., 2003). We observe, however, a distinct differentiation in the distribution of both species. Whereas *Navicula pontica* was abundant in older collections, *Navicula parapontica* is dominant in recent material. This phenomenon we interpret as a result of environmental changes due to the anthropogenic pressure.

Poster

Diatoms of the genus *Stauroneis* on different type springs in Central Poland

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Diatoms from the genus *Stauroneis* C. G. Ehrenberg 1843 are characterized with naviculoid cells, occurring solitarily, or more rarely in small colonies. Species which belongs to *Stauroneis* are freshwater, epipelic, with some subaerial forms inhabiting soil and moss (Round et al. 1990).

During long-time research taken on diatom flora on springs in Central Poland, 20 species of genus *Stauroneis* were identified. These springs differ in geological surface (limestone and quaternary), hydrochemical features, and hydrobiological type (limnocrenic, reocrenic).

The taxonomical analyses carried out on the base of morphological features of valves observed in LM and SEM, and on statistical analyses were used for distinguishing of the species previously referred to as *Stauroneis phoenicenteron* (Nitzsch) Ehrenberg.

The species frequent in the investigated springs are: *Stauroneis smithii* Grunow, *St. separanda* Lange-Bertalot & Werum, *St. legumimopsis* Lange-Bertalot & Krammer and *St. thermicola* (Petersen) Lund. While rarely noted species were: *Stauroneis integra* Van de Vijver & Lange-Bertalot, *St. tackei* (Hustedt) Krammer & Lange-Bertalot, *St. obtusa* Lagerstedt, *St. agrestis* Petersen, *St. pseudagrestis* Lange-Bertalot & Werum, *St. heimi* Lange-Bertalot & Krammer. Most of them are rare and new for diatom flora of Poland, in general.

One of the most interesting taxa is *Stauroneis lauenburgiana* Hustedt, observed currently in three springs of limnocrenic, limestone and reocrenic, quaternary types. Previously, this species has been noted in Poland once, in the Czarne Lake at the Suwalskie Lakeland (Rakowska 1996). The morphological variability of the species was analysed and is supported with LM and SEM microphotograph documentation.

Poster

Epilithic diatoms from two rivers in the Strouma River basin, Southwestern Bulgaria

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The diatom taxa composition in the epilithon of two mountain rivers in Southwestern Bulgaria – Rilska and Blagoevgradska Bistritsa, was studied in detail for the first time. Both rivers rise from Rila Mountain and flow into the 5th largest river in Bulgaria – Strouma River. Along the catchment of Rilska River five sites (1452 to 370 m above sea level) were chosen and 28 samples were collected. Blagoevgradska Bistritsa River was sampled at seven sites (1500 to 360 m above sea level). A total of 159 taxa (137 species, 21 varieties and one form) from 46 genera were identified. The genera *Gomphonema*, *Navicula* and *Nitzschia* have the highest species richness. According to the diatom communities, the high mountain sites differ from the low land sites. In the upper reaches of the rivers the diatom communities are dominated by *Achnanthidium minutissim*. The lowest reaches have a distinct diatom flora – *Nitzschia paleacea*, *Nitzschia fonticola* and *Encyonema minutum* are the most abundant diatom species in the epilithon of Rilska River, while *Nitzschia palea*, *Eolimna subminuscula* and *Mayamaea atomus* var. *permitis* dominate in the lowest part of Blagoevgradska Bistritsa River. These results also correspond to the water chemistry data from the studied rivers.

Poster

Five new diatom species from the South Shetland Islands, Antarctica

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The South Shetland Islands comprise a long series of islands, situated at 120 km from the Antarctic Peninsula. The best known islands are King George Island, Deception Island and Livingston Island. The latter has recently been the subject of several diatom studies. During a survey of the non-marine diatom flora of the South Shetland Archipelago, a large number of unknown species has been found belonging to the genera *Navicula*, *Hantzschia*, *Placoneis*, *Geissleria*, *Luticola* and *Stauroneis*.

The poster presents 5 new species based on LM and SEM observations. For each species, its morphology, ecology and distribution are briefly discussed and a comparison is made with similar taxa. *Placoneis australis* Van de Vijver & Zidarova nom. prov. shows some similarities with *P. paraelginensis* Lange-Bertalot and *P. elginensis* (W. Greg.) Cox but differs by its stria structure and density. *Luticola rayae* Zidarova & Van de Vijver nom. prov. belongs to the group of *L. mutariqisis* (Van Heurck) Mann but shows a totally different raphe structure with central raphe endings hooked towards the stigma. *Navicula temniskovae* Zidarova & Van de Vijver nom. prov. is part of the *Navicula tenelloides* group. *Geissleria gabrielae* Zidarova & Van de Vijver nom. prov. shows all features typical for *G. rhomittica* (Bock) Lange-Bertalot & Metzeltin and *G. punctifera* (Hust.) Lange-Bertalot et al. Finally, *Stauroneis nikolayi* Zidarova nom. prov. can only be confused with *S. lousvikensis* Van de Vijver & Lange-Bertalot but differs by its dimensions and raphe structure.

Poster

The diversity of *Hantzschia* species on Livingston Island (The South Shetland Islands, Antarctica)

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During a study of the terrestrial diatom flora of Livingston Island (South Shetland Islands, Maritime Antarctic Region), a surprising diversity of *Hantzschia* species was observed. The genus *Hantzschia* (Bacillariophyta) is a relatively small genus with less than 50 species worldwide. Following the adoption of a narrower species concept by certain authors, the number of described *Hantzschia* species increased considerably whereas others were assigned a different taxonomic rank, replacing in many cases former infraspecific taxa of *H. amphioxys* such as *Hantzschia hyperborea* (Grunow) Lange-Bertalot, described under the name of *H. amphioxys* var. *hyperborea* Grunow.
At present, in the Antarctic Region, only cosmopolitan taxa have been recorded (Kellogg & Kellogg 2002) such as *H. amphioxys* or *H. hyperborea*.
Since the genus *Hantzschia* is quite common in terrestrial habitats of the Antarctic Region, a revision of the species present became inevitable. The present poster shows the results of the revision of the *Hantzschia* species present on Livingston Island. Apart of the commonly reported from the Antarctic *Hantzschia amphioxys* and the related *H. amphioxys f. muelleri*, in samples taken from only three localities on the island, several other *Hantzschia* taxa were discovered. All taxa were studied based LM and SEM observations. Four of them are described as new species and one as a new variety. One of the species is identified as *Hantzschia* cf. *abundans* while another, still not properly identified, is illustrated and discussed.

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National Botanic Garden of Belgium

The National Botanic Garden of Belgium is one of the larger botanic gardens in the world. Its cradle stood in the centre of Brussels. This 18th century garden was moved to make way for an industrial exhibition in 1830. In order to save the valuable plant collections, the Royal Society for Horticulture and Arboriculture of the Netherlands was founded. The Society laid out a new botanic garden in the rural countryside where nowadays the busy Brussels North Railway Station is located.

The principal activities of this garden were economic due to the development of annexations with the Dutch colonies. After Belgian independence the attention shifted to the botany of Central Africa and horticulture. In this period the head gardener Bressiers 'invented' Belgian endives (witloof) in the cellars of the garden. Due to the encroaching city the Garden moved again.

In 1938, the Belgian state bought the Bouchout Domain (Meise) from the royal family, previously inhabited by King Leopold II's sister Charlotte, the Empress of Mexico.

The Bouchout Domain has a total area of 92 hectares. The living plant collections contribute to the botanical and horticultural research as well as to the education and conservation activities of the Garden. The greenhouse and outdoor collections together hold nearly 25,300 accessions of living plants (about 17,400 taxa and 3,170 genera) which is about 6% of all known plant species of the world. Half of them can be seen in our greenhouses (Plant Palace), the other half, comprising cultivated and indigenous plants, grows outdoors.

The Plant Palace, 13 interconnecting glasshouses, simulates the climates of different regions of the world e.g. rainforest, desert, Mediterranean... Two of the glasshouses have a thematic approach: the Evolution House and Mabundu, which houses tropical useful plants like crops and spices.

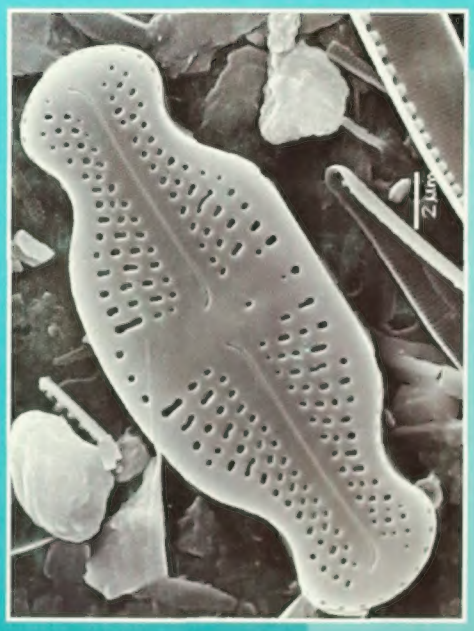
The Outdoor Collections accommodate about 7,630 taxa from all temperate regions of the world. A major part of them is planted in thematic collections open to the general public. Three systematic collections form the core of these plantings: the Herbetum (herbaceous plants arranged to the systems of Cronquist & Takhtajan), the Fruticetum (woody plants arranged to the system of Dahlgren) and the Coniferetum (gymnosperms arranged by genus). Nearly all hardy or 'half-hardy' genera are represented in these collections.

Another collection type is shown by the genera collections which give a thorough overview of the representatives of species and cultivars in the genera *Quercus*, *Rhododendron*, *Hydrangea*, *Acer* (Japanese & Chinese), *Magnolia*. Other developed thematic collections are the medicinal plants garden, the North American forest theme, the Mediterranean plants collection. A lot of collection plants are displayed in shrubberies and mixed borders all over the park. Rare or unusual tree species and cultivars are dispersed over the lawns and play an important role in the landscape dominated by indigenous tree plantations.

History of Sciences Museum (Ghent University)

The museum, which is part of the Faculty of Sciences, presents regularly temporary exhibitions. On show is an exhibition around the beginnings of electric lighting and the first electric bulbs.
A major part of the permanent display at the museum is devoted to the Henri Van Heurck collection. The collection contains over 100 historically important microscopes. Also on display is the exceptional Carl Zeiss microscope objective with N.A. 1.60. In connection with the visit of the Van Heurck Symposium, a small display is set up showing a selection of the scientific instruments used by Van Heurck, e.g. early X-ray tubes and some of the photographs he made in February-March 1896. Will also be shown: microtomes and related equipment, photomicrography apparatus, some interesting family documents, bezoars, etc. The participants of the Diatom Taxonomy symposium also have the opportunity to visit the general display of 18th and 19th century scientific instruments. If time permits, we will have a quick look at the Joseph Plateau physics collection, showing a world famous unique collection of phenakistiscope disks (related to the pre-cinema).

Scripta Botanica Belgica **45**



The present issue provides the programme and abstracts for the oral and poster presentations at the Diatom Taxonomy in the 21st Century symposium, held in honour of Henri Van Heurck who died in 1909. This conference was organised by the National Botanic Garden of Belgium at Meise. The meeting took place at the Bouchout Castle in Meise from August 23rd-26th 2009. Themes include morphology, taxonomy, phylogenetic systematics, biogeography, ecology, and life cycle studies of the diatoms (Bacillariophyta).

ISBN 9789072619808
ISSN 0799-2387
D/2009/0325/2